DIFFERENCES OF OPINION AND ABNORMAL TRADING VOLUME ON STOCK EXCHANGE OF THAILAND

by

KITTIPONG DUANGSRIMANEERAT

A Thesis submitted in partial fulfillment of the requirements for the degree of

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Assumption University
Bangkok, Thailand
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Abstract

This empirical study is a parallel study of Bamber, Barron and Stober (1997). It has similar result that trading volume is positively related to differences of opinion. There are 3 measurements of differences of opinion; (i) prior dispersion of market opinion before interim earning announcement, (ii) change in dispersion of opinion and (iii) the rate of jumbling of opinion.

The change in dispersion of opinion could be considered as negative precision of announcement in Kim and Verrecchia (1991). The result of this study has higher level of change in dispersion of opinion. It can be interpreted that Stock Exchange of Thailand, a market with short-sales constraint, has higher trading cost (Barron & Karpoff 2004).

However, the result has low F-statistic and adjusted R-square. This can be interpreted in many ways: the model has weak statistical power due to small sample size, target price is a weaker proxy for market opinion, the use of abnormal volume is improper for model specification, the Stock Exchange of Thailand is a noisy market, or in the extreme, there is no relationship between trading volume and differences of opinion. For clearer understanding, further investigation may be needed.
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# Contents

Abstract ii
Acknowledgment iii
List of Tables vii
List of Figures viii

Chapter 1 Introduction 1

1.1 Background of the Study 1
1.2 Statement of Problem 13
1.3 Research objectives 15
1.4 Scope of the study 15
1.5 Limitations of the study 15
1.6 Significance of the study 16
1.7 Glossary of terms 17
1.8 Organization of the study 18

Chapter 2 Review of Related Literature and Empirical Studies 19

2.1 Dependent Variable: Abnormal Trading Volume 19
2.2 Target Price as a proxy of market opinion 23
2.3 Independent Variable: Differences of Opinion 28

Chapter 3 Theoretical and Conceptual Framework 31

3.1 Definition of Terms and Variables 31
   3.1.1 Definition of abnormal volume 31
   3.1.2 Definition of differences of opinion 34
      3.1.2.a Prior dispersion of opinion 34
      3.1.2.b Change in dispersion of opinions 35
      3.1.2.c Opinion jumbling 36
   3.2 Conceptual Framework 37
3.3 Research Hypothesis 38
3.4 Operationalization of Variables 39

Chapter 4 Research Methodology 40

4.1 Method of research used 40
4.2 Sampling Procedure 40
4.3 Research Instrument 41
4.4 Collection of Data 41
4.5 Statistical Treatment of Data 43
Chapter 5 Data Presentation and Critical Discussion of Results 45

5.1 Descriptive Statistics 45
5.2 Justification of Data: Removing Outliers 50
5.3 Hypothesis Testing 57
5.4 Validation of Underpinning Assumptions 59

Chapter 6 Conclusion and Recommendations 64

6.1 Summary of Findings 64
6.2 Conclusions 64
6.3 Recommendations 66
6.4 Suggestions for Future Studies 67

References 69

Appendix A 73
Appendix B 75
Appendix C 76
List of Tables

Table 3.1: Operationalization of variables 39
Table 5.1: Number of brokers, reports issued and company followed 45
Table 5.2: Reports issued between May to October 2007 46
Table 5.3: Number of reports categorized by its comparative issuance date 47
Table 5.4: Number of stock at different level of report paired 49
Table 5.5: Descriptive statistics of variables 51
Table 5.6: Kimeng’s target price forecast on Banpu 52
Table 5.7: Descriptive statistics of variables after the change in specification of target price 52
Table 5.8: Result of test regression 54
Table 5.9: Descriptive statistics of variables after removing outliers 56
Table 5.10: SPSS result of regression analysis 57
Table 5.11: Collinearity statistics of the regression result 60
# List of Figures

Figure 1.1: Mind map illustrating causes of trading volume

Figure 1.2: Mind map illustrating causes of trading volume (a)

Figure 1.3: Mind map illustrating causes of trading volume (b)

Figure 1.4: Demand curve of Loderer, Cooney and Van Drunen (1991)

Figure 1.5: Demand schedule measured at an IPO

Figure 1.6: Demand and Supply schedule measured at the opening stage of the market

Figure 1.7: Timeline showing 3 measurements of differences of opinion

Figure 3.1: Conceptualized map of inter-variable relationship.

Figure 5.1: Company’s interim announcement date

Figure 5.2: Number of reports on its comparative issuance date

Figure 5.3: Number of company on different level of following report

Figure 5.4: Histogram of average daily turnover ratio of sampled stock

Figure 5.5: Histogram of $\Delta Disp_i$ plotted with normal curve

Figure 5.6: Plot of residuals with 3 independent variables

Figure 5.7: Histogram of $\Delta Disp_i$ frequency after removing outliers

Figure 5.8: Scattergrams of residuals plotted against predicted value of dependent variable and independent variables

Figure 5.9: Normal P-P plot of regression standardized residual

Figure 5.10: Histogram of standardized residual with normal curve
Chapter 1

Introduction

This chapter introduces brief reasons why abnormal trading volume is determined by differences of opinion. You can skip section 1.1 'Background of the Study' which pictures a canvas of causes of trading volume to the section 1.2 'Statement of Problem' to quickly understand association between abnormal trading volume and differences of opinion. Section 1.3 gives brief objectives of this study. Section 1.4 explains the scope of this study. Section 1.5 shows the limitations of the study. Section 1.6 describes how this study is academically relevant. And the last section of 1.7 breaks down the construction of this study.

1.1 Background of the Study

The study on stock trading volume, despite of its much lesser number comparing to the study on stock price, has gained a strong foothold in academic community. Among the study of causes of trading volume, differences of opinion is one of the hypothesized causes that bring about trade.
This study gathers possible causes of trading volume and presents them through a mind map. The following is a brief explanation of the survey.

The mind map shows breakdown of causes of trading volume. Causes of trading volume can be observed by 2 major viewpoints. One is observed from the reasons by which each trader trades, another is observed by seeing the market as a whole.

The reasons that each trader trades can be divided into 2 groups. First, trader trades because of their innate needs, and second, because of their reaction to some information received.

Naturally, traders will trade even if without outside stimulation. These natural needs are innate inside each trader.
Henke (2002) hypothesized that trading volume increases after the occurrence of mutual fund. The occurrence of mutual fund provokes trade because investors may remove their money from the mutual funds to satisfy their idiosyncratic demand for cash. Eventually, mutual funds have to trade their stocks for liquidity needs of investors – this can be called *liquidity trade* (i).

*Tax-loss selling activity* (ii) usually takes place during year-end, when an investor knows his taxable capital gain for the year. At the same time this investor may have an amount of unrealized capital loss. This convinces him to sell his stocks for an amount of realized loss to offset his capital gains in order to pay less tax. The tax-loss selling activity and *the smoothing of consumption over the life cycle* (iii) (which is simply the need of an investor to trade his saving for stock when he has high earning and trade his stock for consumption when he has low earning) were hypothesized by Grinblatt and Keloharju (2001) as determinants of trading.

Need not to say, not all traders are long-term investors who invest their saving in stock market to use it again during the later stage of their lives – there also are speculators who make their living from capital gain by short-term trading. He and Wang (1995) found that trading volume increase just before and after public announcements because of speculative motive. This is an evidence for *speculative trading* (iv).

Another innate need of the financial institution that provokes trade is index fund. An index tracker fund is a passively managed fund which tries to hold all the stocks in an index in the same proportion as the index. At the addition of new stock to the index, the index tracker fund has to add this new stock to its portfolio as well – resulting into increased trading volume. Shleifer (1986) and Harris and Gurel (1986) are duet study who hypothesized that trading volume arises around the addition of S&P 500 index. They found that *the index fund’s acquisition of index stock* (v) in order to rebalance their portfolio is a main driver of trade.

Besides the *natural innate needs*, traders may trade in order to respond to the information they received. The reaction to information received can be seen in 2 ways; reaction when they have superior and when they have general access to information.
When a trader has *superior access to information*, this is commonly known as information asymmetry problem – a violation against efficient market hypothesis (EMH) in which is an assumption that each trader is equally and fully informed. The existence of superior access to information gives opportunity for some traders to buy cheap stocks and sell the expensive ones.

One of the most known examples of superior access to information is *insider trading* (vi). The insider trading is the trading of a company’s stock by the company’s insiders (such as key officers, major shareholders). The insider trading can be completely legal but this term often refers to the illegal insider trading. According to the law of many countries, company insiders and related parties are prohibited to trade based on non-public information which the insiders obtain while working at the company. Bagliano, Favero and Nicodano (2001) found that insiders trade heavily around the release of new public information. The superior information that insiders have is suspected to be the cause of this abnormally high trading volume.

On the other hand, ownership of superior information may convince trader to trade less. Covrig and Ng (2002) studied trading pattern of institution investors who are more informed than individual traders. They found that institutional traders tend to strategically split their trade into smaller quantities across time in order to prevent their private information from being revealed too quickly. This pattern of *institutional trading* (vii) reduces trading volume.
However, even without superior access to information, traders still trade when they are exposed to some \textit{general information}.

Generally speaking, most traders have only access to general public information, yet they do trade. The evidence of ‘traders trade when securities price has reached a reference point (viii)’ was investigated by Grinblatt and Keloharju (2001). They found that traders are likely to trade when the price reach the last all-time-high price (market-wide reference point), and traders are reluctant to sell the stock at a loss but they will wait until the price reaches the initial price they bought to avoid realized loss (trader-specific reference point).

Grinblatt and Keloharju (2001) also found that the \textit{size of holding period gain/loss (ix)} determines trading decision. That is trader has a time limit to tolerate holding of unrealized gain/loss. For example, a trader may allow himself to hold a looser stock for 1 year, after 1 year, if the price still shows no sign of reversal, then the trader will sell this unproductive stock to invest in a new one.

Moreover, Odean (1998) pointed out that \textit{traders are likely to buy winner stock which has high past return (x)}. This causes the winning stock to have high trading volume.

These indicators of sifting good stock are now known as trading rule. Nagel (2003), facilitated by extensive data set, had designed a set of widely accepted trading rule (such as low P/E ratio, high market cap, low price-to-sales ratio). She hypothesized that traders will first separate good stocks from plenty of stocks with a set of trading rules and will trade on this criteria. She observed high trading volume in the stocks which fit the \textit{trading rule (xi)}.

The cause-and-effect relationship between traders’ reason to trade and trading volume is quite obvious. Besides, there are some determinants of trade which are difficult to \textit{see from trader’s viewpoint} but easier when we \textit{see the market as a whole}.
Figure 1.3: Mind map illustrating causes of trading volume (b)

Bid-ask spread (xii) is the difference between the price of an immediate sale order (bid) and the price of an immediate purchase order (ask). It can be interpreted as transaction cost. The wider the spread, the more a trader has to sacrifice to realize a transaction. Karpoff (1986) theorized the relationship that transaction cost from bid-ask spread discourages trading.

Tick size (xiii) is a stock market jargon which means the size of tick. A tick is a minimum amount that the stock price is allowed to move upward or downward. The size of tick is determined by the stock market regulator. The studies on tick size and trading volume in general have a common goal of convincing the regulator of stock market to reduce tick size in order to lower transaction cost and attract more trading volume. Hameed and Terry (1998) studied benefits of reduced tick size. They found that reduced tick sized may not be beneficial (because of price clustering). However, they concluded that if the stocks are heavily traded, the reduction of tick size is likely to increase trading volume.

Momentum trading (xiv) is a trading strategy. A trader who uses this strategy will look for the winning stock and buy it with a hope that its price will continuously increase for many days. Whether this strategy is always successful is ambiguous, but it always causes trading volume. Statistically, daily trading volume is significantly autocorrelated.
Karpoff (1986) also explained that trading volume lasts beyond one period because traders react to new information not in the same time. There are many explanations of momentum trading volumes. Nevertheless, it is a well perceived pattern that the large trading volume in one period often results in trading volume in successive periods.

*Volatility* of a stock is frequently known as rate of dispersion of stock price within a time period. It can be measured by simple standard deviation. Volatility can be seen as risk an investor facing by holding a stock. Therefore, CAPM’s beta, traditionally price risk, is also volatility of a stock relative to the market.

Relationship between volatility and trading volume is empirically positive. Daves, Wansley and Zhang (2002) found that *CAPM’s beta* (xv) is positively related to trading volume. Martell and Wolf (1987) measured volatility by *difference between daily highest and lowest price* (xvi), and they also found the positive relationship.

*Elasticity of demand for stock* can be counted as another determinant of trading volume. Anyhow, elasticity of demand is only an indicator of demand curve’s pattern. To explain its association with trading volume, we need to understand first demand curve’s pattern. When slope of stock demand is gentle (or demand is highly elastic), we can say that this stock is a liquid stock because a trader can sell or buy a lot of stock with little change in price.

Amihud and Mendelson (1986) gave the underneath reason of this association. They noticed that traders are unwilling to take a large position in illiquid assets if the price discount is not large enough to compensate their risk. This observation convinced them to conclude that large price discount in association with large quantity of trade reflects inelastic demand.

Elasticity of demand can be measured at many occasions. It can be measured when supply of stock shifts, by buy order submitted during IPO, or even by observing normal day buy limit order.
Loderer, Cooney and Van Drunen (1991) estimated demand elasticity from supply shift \(^{(xvii)}\). Supply shift of stock can be observed at a seasonal public offering, SPO. After a company sells its stock to the public the first time (IPO or initial public offering), it may need additional money to grow business. Then the company may sell additional stock to the public, we call all public offerings after IPO as SPO. Loderer, Cooney and Van Drunen (1991) saw the supply of stock as a fixed vertical line. After an increase in supply, they observed decrease in stock price. They calculated demand elasticity by using price and number of stock before and after SPO. And they tested the association between demand elasticity and trading volume, and the result was positive.
Kandel, Sarig and Wohl (1999) avoided problem of invalidity of demand elasticity measured at a supply shift – which is calculated from 2 points of time on demand curve. Then Kandel, Sarig and Wohl (1999) measured elasticity from the complete demand curve at as single point of time which can be seen at an IPO. When a company sells its stock to the public, it may sell through an auction. The investors have to place their bid order to the auctioneer without knowing the bid order of others in the auction. After the winning price is revealed, the price all winning investors actually pay is the lowest winning price. Kandel, Sarig and Wohl (1999) could observe the whole demand curve from this IPO. They calculated demand elasticity measured at IPO (xviii) and found positive association with trading volume.

**Figure 1.6**: Demand and Supply schedule measured at the opening stage of the market

Source: Kalay, Sade and Wohl (2004)

Kalay, Sade and Wohl (2004) had access to limit order (both buy and sell) of Tel Aviv Stock Exchange half an hour before the opening of the market. They constructed the whole demand curve at the beginning of the day. Elasticity directly derived from normal day trading (xix) also shows significant association with trading volume.

The last determinant of trading volume is differences of opinion. They are differences of opinion on expected value of stock. If all traders in the market have identical expectation of stock value, there is no difference of opinion. When a stock
holder expects that his stock has lesser expected value than present price. He will sell it to avoid future loss. But he will not be able to sell if everyone in the market thinks like him. If there is another person who thinks that future value of stock will not be lower than present price, this person is likely to buy the stock which the stock holder wants to sell. Trade occurs because they have differences on expected value.

The term ‘differences of opinion’ is guided by a notion of Pfleiderer (1984), “There is no horse race without differing beliefs.” Harris and Raviv (1993) by their paper named “Differences of opinion make a horse race” also theoretically predicted the positive relationship between differences of opinion and trading volume. However, differences of opinion are a multifaceted idea. Bamber, Barron and Stober (1997) suggested differences of opinion in 3 viewpoints.

1. Prior dispersion of opinion (xx)
2. Change in dispersion of opinion (xxi)
3. Opinion jumbling (xxii)
Figure 1.7: Timeline showing 3 measurements of differences of opinion

This timeline shows disclosures of opinions of analysts and their movement:
- A1 to A6 stands for opinion of analyst 1 to analyst 6 which take place before information release (information 1) which is at different time and different level. Differences of opinion measured at this time is “prior dispersion of opinions”.
- Around the arrival of information 1, analysts’ opinions jumble. Differences of opinion measured at this time is “opinion jumbling”.
- Around the arrival of information 2 analysts’ opinions changed in converging way resulting into negative “change in dispersion of opinion”.

source: Bamber, Barron and Stober (1997)

Along with the assumption of each trader has different opinion on stock value, the natural meaning of differences of opinion are the degree of dispersion of traders’ opinion on stock value – or prior dispersion of opinion.

Kim and Verrecchia (1991)’s model explained the logic behind dispersion of opinions before an information event that the traders have different opinions because they have different information. And at the arrival of new information, traders will revise their opinion on stock value according to their own prior understanding on stock value. The more different opinion traders have before the informational event, the more likely they will have different opinion responding to the new information. This is why prior dispersion of opinion has positive relationship with trading volume.

Atiase and Bamber (1994) also investigated trading volume around earning announcement and they found that prior dispersion of opinion the announcement was positively associated with trading volume.
However, stock market is a dynamic market. Each trader can revise his opinion anytime especially when he receives new information. At an informational event, traders are likely to revise their opinion on stock value as they receive new information. The pattern of revision can be seen in 2 ways. Firstly, degree of dispersion of opinion after informational event may be unlike the degree of dispersion before – this is the first that opinion differs – or we can call it change in dispersion of opinion.

The relationship between change in dispersion in opinion and trading volume is empirically positive. Ziebart (1990) pioneered study on the relationship despite lacking of theoretical support. He found positive relationship between change in dispersion of opinion and trading volume. And in his result, he reasoned that the large change in dispersion of opinion is the sign of heterogeneous interpretation of each trader on public announcement. But the interpretation of each trader might not be different from each other if the new information is not a surprise to them. Then if the new information is a surprise to previous opinions of traders, traders are likely to interpret more divergently. Ziebart speculated that heterogeneous interpretation of information will spur trading volume. And the heterogeneous interpretation can be seen by outsider from the diverged pattern of change in dispersion in opinions.

Secondly, if we sort opinion of each trader before informational event from greatest to lowest, we will see that the order of opinion after informational event can be different from the order of opinion before – this is the second pattern that opinion can differ – or we call it opinion jumbling.

Karpoff (1986) constructed a model of trading volume. He assumed heterogeneous opinion on stock value among traders. There are potential buyers and potential sellers of stock. Karpoff (1986) reasoned that opinion on stock value of both potential buyers and sellers can be sorted from highest to lowest. And both groups will revise their opinion on stock value idiosyncratically at the informational event. The result of this revision is the change in order of opinions. Karpoff (1986) coined the name of reordering of opinion as jumbling. His model explained that jumbling of opinions unlock the opportunity to trade. As the potential buyers think that stock price should be higher while the potential sellers think contrarily that stock price should be lower, and then they trade.
Barron (1995) empirically tested the relationship between *opinion jumbling* and trading volume, he found that higher trading volume can be observed in stocks that have higher jumbling in traders’ opinions.

### 1.2 Statement of Problem


There are 2 measures of trading volume used in Bamber, Barron and Stober (1997): log-transformed actual volume and median-adjusted trading volume (without log-transformation).

The median-adjusted trading volume is similar to abnormal trading volume induced by mean-adjusted method. It is likely to be non-normally distributed (Ajinkya & Jain 1989), hence, improper for any parametric test.

The log-transformed actual volume was evidenced by Ajinkya and Jain (1989) to be normally distributed. But Dyl (1977) reasoned that without using *abnormal trading volume*¹, the analysis would not be free from domination of large companies’ trading volume. Abnormal volume could be a better measure of trading volume.

This study questions why Bamber, Barron and Stober (1997) did not use log-transformed abnormal trading volume to measure trading volume.

This is the first difference from previous studies; this study uses log-transformed abnormal trading volume instead of log-transformed actual volume and median-adjusted trading volume.

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¹ Abnormal trading volume has been a general tool to measure the extent of economic influence around informational event. This is conforming to most empirical works Beaver (1968), Foster (1978), Ziebart (1990). Dyle (1977) gave reason of its advantage. The test of usability of abnormal volume is made by Ajinkya and Jain (1989), Cready and Ramanan (1991), Campbell and Wasley (1996). Tkac (1999) gave a theoretical conjecture of reliability of abnormal volume usage.
Secondly, most studies testing relationship between trading volume and differences of opinion used earning forecast as the analysts’ opinion to proxy market opinion\(^2\).

Brav and Lehavy (2003) stated that there are 4 components in analyst report (earning forecast, target price, stock recommendation and the text details) that can be used as analysts’ opinion. Brav and Lehavy (2003) found that all components are informative. Peek (1997) narrated in his historical survey that analysts’ opinion becomes a proxy for market opinion because it was found to be more informative than other proxies\(^3\). Traditionally, earning forecast was used as the analysts’ opinion. But Au, Asquith and Mikhail (2005) tested information content\(^4\) of earning forecast, stock recommendation and target price and found that target price contains more information than the rest.

This study questions that what would happen if target price, the proxy which was claimed to be more informative (Au, Asquith & Mikhail 2005), is used as analysts’ opinion? This is why this study uses target price instead of earning forecast which was used in Bamber, Barron and Stober (1997).

Lastly, this study is conducted on information of Stock Exchange of Thailand (SET) which has short-sales constraint and thin trading. The use of SET data is due to lacking of capability to acquire larger set of data.

Usage of SET data also may have an advantage of testing under short-sales constraint. Bamber, Barron and Stober (1997)’s study was based on NYSE/AMEX, the markets without short-sales constraint, while some theoretical studies (Karpoff 1986 and Barron & Karpoff 2004) were constructed under short-sales constraint.

Then the last difference in this study is to answer the question: what would the relationship between differences of opinion and trading volume be under short-sales constraint?

\(^2\) The ideal measurement of market opinion is to aggregate opinions of all individual opinion at once. Such an ideal market opinion is not available. Peek (1997) stated that since 1980s, academic community accepted opinion of analysts, important information intermediary, as a proxy of market opinion.

\(^3\) Other proxies of market opinion are derived from many models; time series based model, security pricing based model, financial statement based model and financial analyst based model. The earning forecast is derived from financial analyst based model.

\(^4\) According to the definition of Beaver (1968)
1.3 **Research objectives**

The objective of this study is to uncover the relationship between abnormal trading volume and several measures of differences of opinion from the data of SET.

The differences of opinions can be derived from many proxies for market opinion. Therefore, this study also has the objective of using analysts' target price instead of analysts' earning forecast as the proxy of market opinion.

1.4 **Scope of the study**

The study is a cross-sectional study with only a single time period - 180 days during second interim earning announcement 2007 which took place around the end of August 2007.

The study does not select all listed common stock in Stock Exchange of Thailand (SET). The selection criterion is that the selected stock should have at least 3 analysts' target price 90 days before and 90 days from the announcement. And the 3 pairs of analysts' forecast must be from the same brokerage company, consistent with Stickel (1993). Thus, there are only 71 stocks in the sample size.

1.5 **Limitations of the study**

This study has limitations as follow

Firstly, this study is conducted from 2nd May to 31st October 2007. There are some major macro-economic situations (e.g. Thai Baht appreciation, political instability) that could affect the result of this study.

Secondly, the independent variables are calculated based on 3 pairs of forecast which weakens statistical power of the result.

Thirdly, the forecasts used are stale forecast because the wide estimation window of 90-calendar-day. In order to maximize the sample size, it is a necessary inaccuracy of the study.
Fourthly, though the sample is selected by a loose criterion, the sample size is still small (68). Because this study is a cross-sectional of 1 quarter unlike Bamber, Barron and Stoher (1997) which was conducted on 40 quarters.

Fifthly, abnormal trading volume has many calculation methods. This study uses Ajinkya and Jain (1989)'s method to derive abnormal trading volume.

Sixthly, there is no settled agreement on the full meaning of differences of opinion at present. This study interprets differences of opinion in 3 aspects only (prior dispersion of opinion, change in dispersion of opinion and opinion jumbling).

And finally, the ideal differences of opinion should be calculated from the ideal market opinion. Because data of market opinion is unavailable this study chooses only analysts' target price as the market opinion. But the target price data has limited number. Information of market opinion is not available from every stock in the SET.

1.6 Significance of the study

This study is significant in 3 ways. Firstly, it tests differences of opinion against abnormal trading volume. Abnormal trading volume is accepted as having higher detectability of economic influence than actual trading volume which is used by previous study, Tkac (1999).

Secondly, this study derives differences of opinion based on analysts' target price. Target price is claimed to contain more information than other proxies of market opinion. This study provides further understanding of information content of target price.

Lastly, this study tests on SET data, a market with short-sales constraint. This is consistent with previous theory, Karpoff (1986), which is based on a market with short-sales constraint unlike the previous empirical study which test on the market without short-sales constraint.

This study would benefit readers to understand more of the differences of opinion by different settings from the previous study.
1.7 Glossary of terms

*Abnormal trading volume* in this study is the actual trading volume in excess of normal volume.

*Actual trading volume* in this study is the daily turnover ratio.

*Change in dispersion of opinion* is posterior dispersion of opinion minus prior dispersion of opinion.

*Differences of opinion* is the degree of difference of expectation of all traders in the market on the intrinsic value of a stock. Harris and Raviv (1993) may be the person who first use this term, however, there are alternative ways to describe the similar meaning; disagreement in consensus of belief, divergence of expectation, heterogeneity of traders – presently no generic term is established.

*Information content* is coined by Beaver (1968). A signal that comes into market has information content if it alters stock price.

*Informative event* is an event that contains information – usually an earning announcement or a macro-economic announcement which usually followed by stock price fluctuation.

*Interim announcement* is the announcement on company’s quarterly performance.

*IPO* stands for initial public offering.

*Issuance date* of analysts’ report in this study is its appearance date on the settrade.com.

*Noise* in rational expectation model means the unexpected trade originated from idiosyncrasy of traders – unexplainable by reason.

*Normal trading volume* is the expected trading volume – trading volume that should take place in that period.

*Opinion* is the opinion on stock value.

*Opinion jumbling* is coined by Karpoff (1986). The actual term used in his study is belief jumbling. It describes a pattern of market opinion revision. When a signal comes into a market, the market participants revise their opinion; the revised market opinion is jumbled if it is in disordering pattern comparing to the market opinion before revision.

*Precision of announcement* or information precision is coined by Kim and Verrecchia (1991). When a piece of information arrives the market, usually an earning announcement, it is precise to the concurrent market expectation if it turns out very close to what everyone expects.

*Price clustering* is the pattern of pricing when market participants bid/ask. Bid/ask price usually clusters around specific number, round and whole and discrete number than fraction or the number ended with 5 or 0 than other number. It may be coined by Harris (1991).

*Prior dispersion of opinion* is the dispersion of market opinion before an informative event, generally proxied by the analysts’ forecast dispersion.
Public disclosure is the release of low cost information to the public via the exchange, mass media or other government agents, usually, it is company’s earning announcement.

SET is the stock exchange of Thailand.

Signal, in economics, is coined by Michael Spence in his work on asymmetric information. It is meaningful information a market party, an agent, sends to another market party, or principal. The agent has cost of sending signal. The principal needs to interpret the signal, and decide to trust the signal.

Short-sale constraint is a stock market regulation which prohibits stock short selling.

Target price is the expected price of a stock one year ahead conducted by an analyst.

Transaction cost or trading cost is all the costs occurred during an economic exchange. For stock market, it can be from search cost for good stock, brokerage fee, market impact, bid-ask spread, taxes, to the second brokerage fee for a round-trip transaction. Short-sale constraint is a transaction cost because it makes the transaction more difficult, or in other word, it increases the market impact.

Turnover is the number of shares traded on a trading day divided by the total number of shares outstanding.

1.8 Organization of the study

This study is organized in 6 chapters. Chapter 2 provides reviews of related empirical and some theoretical studies. Chapter 3 is about research framework. Chapter 4 explains methodology of this research. Chapter 5 describes results of the analysis of data. And chapter 6 concludes all findings.
Chapter 2

Review of Related Literature and Empirical Studies

This study is to investigate the relationship between trading volume and differences of opinion. Section 2.1 reviews literature on abnormal trading volume. It explains how abnormal volume may be more suitable for cross-sectional study than actual trading volume. It also explains many method of deriving abnormal trading volume. Section 2.2 reviews literatures on target price as a substitute for earning forecast. Traditionally, analysts’ earning forecast is used as a proxy for market opinion. But this section shows the reason that target price can be a proxy for opinion of traders as well. Section 2.3 reviews literatures on differences of opinion and how it affects trading volume.

2.1 Dependent Variable: Abnormal Trading Volume

Beaver (1968) proposed that when a signal, or information, arrives the market, the signal contains information if price changes. Beaver (1968) also suggested trading volume as an alternative to identify the information content of the signal. Beaver (1968) conjectured that trading volume around the arrival of new information is due to a lack of consensus on how new information should be interpreted; as written in pp. 69 of his study.

“The relationships posited above are consistent with the economist’s notion that volume reflects a lack of consensus regarding the price. The lack of consensus is induced by a new piece of information, the earnings report. Since investors may differ in the way they interpret the report, some time may elapse before a consensus is reached, during which time increased volume would be observed. If consensus were reached on the first transaction, there would be a price reaction but no volume reaction, assuming homogeneous risk preferences among investors. If risk preferences differ, there still could be a volume reaction, even after the equilibrium price had been reached.”

Following the theoretical studies, there were numerous empirical studies trying to infer relationships from trading volume reaction to new information. However, there are generally 2 measures of trading volume in their model specification; actual trading volume and abnormal trading volume.

Actual trading volume is the raw trading volume. Abnormal trading volume is the trading volume in excess of what it should be.

Dyl (1977) stated that “abnormal volume may be defined as the difference between the actual trading volume observed in a given month and the expected volume.”

\[
\text{Abnormal Volume}_t = \text{Actual Volume}_t - \text{Expected Volume}_t
\]

This is the definition of abnormal volume used by most studies. The expected volume in equation-1 is also known as the normal volume.

Previous studies had explained 2 general advantages of the use of abnormal trading volume over the actual volume. Firstly, it permits comparison across companies which, in general, differ in magnitude of actual trading volume. Dyl (1977) stated that absolute trading volume causes companies with large trading volumes to dominate any analysis involving interfirm comparison. Next, it is free from portfolio rebalancing activities. Grundy and McNichols (1989), in their theoretical framework, argued that trading volume of the entire market is affected in response to public information release. An individual company, a component of the market, after affected by public information disclosure, it may be sold or bought by investors. At the same time, investors buy or sell other stocks in the market through their rebalancing activities. Morse (1980) explained that by removing variances due to market-wide factors, abnormal trading could have stronger statistical performance. Dyl (1977) claimed that high trading volume should be truly high when comparing to others’ trading volume.
According to Ajinkya and Jain (1989), there are 2 approaches to abnormal trading volume: company-specific approach, and market-related approach. These are the names of previous studies cited by Tkac (1999) categorized by the approach they use.


Both approaches agree on the same meaning of abnormal volume.

\[ Abnormal\ Volume_{\tau} = Actual\ Volume_{\tau} - Normal\ Volume_{\tau} \]  
\[ \text{equation-1} \]

But there are many methods to derive expected normal volume.

The company-specific approach derives expected normal volume by company-specific information only which is the company trading volume.

\[ Normal\ Volume_{\tau} = \sum_{t}^{\tau} Actual\ Volume_{t} \]  
\[ \text{equation-2} \]

Normal trading volume on day \( \tau \) equals to the mean of actual volume of \( t \) days. Day \( \tau \) is the day in event window. The event window can either be of 1, 3, 5, 7, 9 or 11 days. Normal volume in event window is estimated from actual volume in estimation windows. The estimation window can be either trading days before or around the event window. Suppose the event window is only of one day – or day \( \tau=0 \). And the estimation windows is 60 days, \( t=60 \). The estimation window estimated before event window may be from day -60 to day -1. But the one estimated around event window may fall on day -30 to -1 and day 1 to day 30. Ajinkya and Jain (1989) commented that choice of estimation window and event window is subject to researcher’s preference. Tkac (1999) pointed out that all empiricists estimated normal volume outside the event window.

The market-related approach assumes that expected normal trading volume is influenced by both company-specific and market-wide information. Beaver (1968) observed significant relationship between company’s trading volume and the market trading volume. Morse (1980) noticed that market-wide information may encourage this
occurrence. Tkac (1999) demonstrated that this may due to portfolio rebalancing activities.

Traditionally, market-related expected normal volume is derived by the following regression

\[ \text{Actual Volume}_{t,\tau} = a_i + b_i \text{Market Volume}_{t,\tau} + e_{t,\tau} \]  

\text{equation-3}

After running regression using actual company-specific and market volume in the estimation window, the normal trading volume can be obtained by substituting the market volume of event window into the regression.

\[ \text{Normal Volume}_{i} = a_i + b_i \text{Market Volume}_{i} \]  

\text{equation-4}

This is the simple OLS method.

Ajinkya and Jain (1989) documented autocorrelation in trading volume. Trading volume is serially correlated with past trading volume. This could arise when all the traders do not trade within one day on information they use to rebalance their portfolios. In equation-3, both trading volume, and the residual are significantly autocorrelated. Ajinkya and Jain (1989) suggested Estimated Generalized Least Squares (EGLS\textsuperscript{5} – Cochrane-Orcutt procedure) to resolve this problem.

Therefore, there are 3 method of deriving abnormal volume.

1- Mean method (i.e. company-specific approach)
2- OLS method (i.e. market-related approach)
3- EGLS method (i.e. market-related approach)

The comparison of these 3 methods is mentioned later in this section.

Ajinkya and Jain (1989), Cready and Ramanan (1991), Campbell and Wasley (1996) documented that raw trading volume is not normally distributed. They thoroughly used different model specifications, whether based on several definitions of actual volume, estimating from different ranges of estimation windows, and by different methods of deriving abnormal volume. They documented that the untransformed trading volume is significantly not normally distributed. Thus they applied natural log transformation to the actual trading volume and recalculate. They found that the natural-

\textsuperscript{5} Explanation of Cochrane-Orcutt method obtained from Social Science Data Laboratory, Department of Political Science: University of Colorado at Boulder. It is explained at the appendix A.
log-transformed abnormal trading volume from various deriving specifications shows satisfactory result, which is suitable for statistical testing based on normality assumption. All of 3 studies agreed on the same method of log-transformation\(^6\).

\[ Log - transformed \ Volume = \ln(1 + Actual\ Volume) \] equation-5

The reason of adding 1 to the equation-5 is to avoid taking log of zero. Lastly, this is the summary of strength of each abnormal volume deriving approach.

Company-specific approach (mean method) has strength owing to its suitability for cross-company comparison and ease of calculation.

Market-related approach is based also on additional information of the market. This approach eliminates variances due to unrelated market-wide factors (Morse 1980). Tkac (1999) theoretically proved that this originates from portfolio rebalancing activities. Statistically, this approach is more reliable than the mean method especially in case that abnormal volume of different stocks is measured in clustered event windows, i.e. measured approximately on the same day (Ajinkya & Jain 1989).

Within the market-related approach EGLS method is better than OLS method because EGLS method eliminates the first order serial correlation from actual trading volume, this relieves autocorrelation pattern of trading volume.

### 2.2 Target price as a proxy of market opinion

This section gradually explains how academic world accepts analysts’ opinion as a proxy for market opinion. Both target price and earning forecast are important forecasts in the analyst report. The traditional analysts’ opinion is represented by their earning forecast, however, this section little by little suggests target price as an alternative to earning forecast. Eventually, it proposes that target price may be a healthy proxy for market opinion as well.

\(^6\) Difference between these 3 studied is, in brief, Ajinkya and Jain (1989) use additive inducement method to induce abnormal trading volume, Cready and Ramanan (1991) use multiplicative inducement, and Campbell and Wasley (1996) use non-parametric testing to detect abnormal volume. Detailed discussion is at the appendix.
In order to understand background of the usage of analysts’ opinion, the survey study of Peek (1997) gave details of the historical development of analysts’ opinion as proxy of market opinion.

1960s Positive accounting research, aimed at explaining and predicting accounting phenomena, gained popularity at the expense of normative prescriptive accounting research. … As explanation and prediction in positive accounting research both need an underlying theory, usually economics or behavioral sciences, in one branch of positive accounting, financial economic theory forms the basis of analyzing practices in capital markets. … This stream of research, known as market based accounting research, brought forth studies on the relation between stock prices and accounting information, initiated by Ball and Brown (1968) to determine the ‘usefulness’ of reported earnings. …

… In the Ball and Brown study and most following studies (e.g., Ali and Pope 1995; Bernard and Stober 1989) the amount of unexpected earnings equals the difference between realized earnings and a time-series based earnings forecast … Underlying notion of early earnings forecasting research is that if financial analysts’ earnings forecasts outperform time-series based earnings forecasts, preference should be given to the former as a market expectations proxy. Thus, much research has concentrated on earnings forecasts as a proxy for capital market expectations since the 1980s (see Brown 1993). …

… In course of time more researchers have begun to focus on the earnings forecasting process itself, simply motivated by the importance of financial analysts as users of financial statement information and as intermediaries between capital suppliers and companies …

… One may conclude that in course of time a subservient role of earnings forecasting research has given way to a more central role.

The analysts’ opinion in Peek (1997)’s study was analysts’ earning forecast. Peek (1997) pointed out that past studies prefer using earning forecast as the proxy for market opinion because properties comparing to alternative market forecasts.

There are 4 common market forecast models; time-series based, security pricing based, financial statement based and financial analyst based models.

Earning forecast is one of the financial analyst based models. Brown, Richardson and Schwager (1987) posited that financial analysts’ earning forecast is more advantageous than other forecasts because it is processed from all available contemporary information in the market. They further suggested that it is also due to timing advantage of earning forecast. Analysts are freer to disclose their forecasts; usually the analysts disclose their opinion after they have gathered sufficient information.
Peek (1997) stated that financial analysts are important information intermediaries in the capital market. Some market participants may learn analysts’ opinion to form their own opinion. And even if the market participants do not rely on analysts’ opinion, their expectations tend to be correlated because both analysts and other market participants use almost the same element of available information. Peek (1997) concluded that analysts’ forecasts at the aggregate level may proxy for the market expectation.

The above are the origin and reasons of the usage of earning forecast as market opinion proxy. However, when an analyst discloses his opinions through a report, there is also a number of information along with earning forecast. Bradshaw (2002) separated important content of analyst report into 4 parts: earning forecast, stock recommendation, target price, and the text details.

Earning forecast is the analyst’s forecast on earning of the followed company. It could be a forecast of interim earning announcement, or an annual one. Stock recommendation is perhaps the main message of analyst report because every report contain the analyst’s recommendation whether to buy or sell or hold. The recommendations of each analyst are quite diverse in format. Traditional brokerage houses use 5 levels of recommendation (strong buy, buy, hold, sell, strong sell); some use only 3 levels (buy, hold, and sell). And other formats can also be seen such as; long hold, long-term buy, buy on weakness, neutral, trading buy, reduced, fully-valued, or outperform-market. These diverse formats make it difficult to rank nominal data of stock recommendation and be used in the analysis.

Target price is also an information in analyst report. It does not appear in every report. Generally, it means predicted price one year ahead of time. It also comes in many alternative names; fair value, objective price. The brokerage houses who use the alternative names claim that theirs are different from traditional target price; however, this claim is ambiguous. Bradshaw (2002) regarded different names of target price as of the same meaning in his study.

There are also other text details in the analyst report most of them are market-wide factors or non-financial-statement information which analysts use to support their opinion.
This study proposes to use target price instead of the traditional earning forecast to measure the reaction from differences of opinion. The securities analysts association of Thailand, SAA-Thai, defines target price as the stock fundamental value of the next 12 months.

This is some interesting statistics on target price. Au, Asquith and Mikhail (2005) defined accuracy of target price as; a target price is accurate if the price of the analyzed company equals to target price at anytime during the 12-month period after the release of the report. They document that most target price from all American report during 1997-1999 is accurate. Bradshaw (2002) found that the target price to price ratio is 1.36 on average.

In fact, earning forecast cannot be the sole monopolistic proxy for market opinion. Rayburn (1986) and Ali and Pope (1995) documented that when dividing financial report into 2 basic components; cash flow and accruals. Investors differently value these two components as generating information. Earning forecast alone is not sufficient to reflect all followed company’s information. Hirst, Koonce and Simko (1995), based on psychology research, predicted and found that investors seek out other information in analyst report when there is unfavorable news. Bradshaw (2002) discovered that, under the unfavorable news, analysts appear to use non-financial statement information to support their opinion. Barker (1999) interviewed analysts through questionnaires. He found that most analysts consider quality of management as an important assessment of followed company. These are reasons that earning forecast alone cannot represent analysts’ opinion.

Brav and Lehavy (2003) reasoned that earning forecast should be less informative comparing to target price because earning forecast is an input into the target price calculation. They stated that “target prices provide investors with the analyst’s most explicit quantitative statement regarding firms’ expected returns” – suggesting target price as an alternative representative of analysts’ opinion.

The above are descriptive reasons to use target price as proxy for market opinion. The following is a review of literatures which test the usefulness of target price.

According Beaver (1968), a signal contains information if price changes responding to the signal. Frankel and Lee (1998) documented that target price is
associated with stock price, hence informative. Brav and Lehavy (2003) compared the informativeness of earning forecast, stock recommendation and target price, and find that all are informative. And target price has inter-relationship with earning forecast and stock recommendation. Bandyopadhyay, Brown and Richardson (1995) found that short-term earning forecast explains 30% of target price and long-term earning forecast explains 60% of target price, suggesting that target price uses both long-term and short-term information as its input.

Brav and Lehavy (2003) further their test by testing informativeness of target price at the presence of other 2 signals; earning forecast and stock recommendations. They found that target price is informative even controlled for effects of earning forecast and stock recommendation, especially, in long term. Au, Asquith and Mikhail (2005), based on study of Brav and Lehavy (2003), also documented the informativeness of both target price and earning forecast. Their model discovered that target price is more informative than earning forecast. However, after adding extra information in the model, earning forecast did not have significant relationship with price change, while target price still significantly explained price change.

The previous empirical evidence suggested that because target price is also informative so it can be a healthy proxy for market opinion as well.

However, the direct use of raw target price may not be proper. Stickel (1998) reported optimistic bias on stock recommendations. Au, Asquith and Mikhail (2005) also found that analysts rarely issue sell or strong sell recommendations, but instead, they choose not to issue report at all. As a result, Brav and Lehavy (2003) found that the distribution of raw target price is rightly skewed.

The empirical findings of positive bias of target price may result from following reasons.

Firstly, Francis and Philbrick (1993) explained that analysts want to curry favor with management, because the management of a followed company is an important source of information for them. Secondly, the existence of a direct relation between the management of a followed company and the management of the following company, usually the the brokers are also the investment bankers. Lin and McNichols (1998) documented that investment bankers force their analysts to act optimistically to cultivate
relationship with their clients. Thirdly, the processing bias of analysts is also documented. O’Brien (1988) found that on average financial analysts do not include unanticipated macro-economic information in their processing procedure. The unanticipated information usually has negative impact on company, resulting into the relative optimistic opinion of analysts.

The optimistic bias of target price could make raw target price improper for statistical tests based on the assumption of normal distribution. This study uses natural log transformation as suggested by Ajinkya and Jain (1989) to treat this problem.

2.3 Independent Variable: Differences of Opinion

Majority of previous studies emphasized impact of differences of opinion on stock price. This study keeps different track, it investigates impact of differences of opinion on trading volume.

Beaver (1968) conjectured that a lack of consensus generates trading volume. The conjecture initiated numerous empirical investigations on differences of opinion and trading volume. Following preliminary empirical studies, theorists constructed several models according their own interpretation of meaning of differences of opinion. The intuitions of theorists were different due to the fact that they perceived differences of opinion by different aspects. Most of them yielded the same conclusion consistent to Beaver’s conjecture.

According to Harris and Raviv (1993), there were 2 branches of theoretical studies on differences of opinion;

Two branches of the literatures concern us: the rational expectations asset pricing models\(^7\) and the differences of opinion models. Rational expectations models generate disagreement through private information. These models generally involve trading among privately informed traders, uninformed traders, and liquidity (or noise) traders.\

… Disagreement (from rational expectation model) is the result of different private information. … (Most trade is initiated by speculators.) The speculators try to infer information of others (indirectly) from observing others’ behavior or the market prices. Each market agents are influenced by the belief of others; that is, agents are influenced by the beliefs of others. As a result, the ability of traders to learn from prices and the behavior of other traders must be obscured by noise. …


... Volume from these (rational expectation) models includes portfolio rebalancing, liquidity, and speculative trades.

... The second branch of the literature in which trading is induced by differences of opinion.

The model based on differences of opinion\(^8\) which Harris and Raviv (1993) explained was constructed on an assumption that traders interpret information differently. Even though there is no general theory that unifies all aspects of differences of opinion\(^9\), the extant theories had enlightened the way we understand how differences of opinion affect trading volume.

In general, theories should be used with care (Barron & Karpoff 2004 and Kim & Verrecchia 1991) because each theory is constructed on a set of assumptions. When an assumption is violated, prediction of theory may result in the opposite way.

This empirical study focuses in narrow range of predictions from theoretical studies. It focuses on the result of this following 3 aspects of differences of opinion; prior dispersion of opinion, change in dispersion of opinion, and opinion jumbling.

Rigorously, prior dispersion of opinions could mean many things. In model of Kim and Verrecchia (1991), it was from investors’ heterogeneous private information. Harris and Raviv (1993) argued that it could be different way investors interpret information. Hindy (1989), however, allowed traders in his model to have both different private information and different interpretation of information. Nevertheless, the predictions from their models were the same; prior dispersion is followed by trading volume.

This study could not specify whether the differences of opinion of analysts are from their differing valuation method or from different private data. The prior dispersion of opinion is the prior dispersion of gross opinion.

Empirically, there were a number of studies using this same meaning of prior dispersion of opinion. Lang, Litzenberger and Madrigal (1992) documented positive relationship between prior dispersion of opinion and trading volume around earning


\(^9\) It should be noted that differences of opinion used by this study is slightly different from Harris and Raviv (1993)’s definition. The definition used by this study is in a broad sense of differences of opinion, it begins from the way traders acquire information, perceive, interpret, and revise.
announcement. Ajinkya, Atiase, Gift (1991) found this positive correlation even unrelated to the earning announcement date.

Effect of change in dispersion of opinion is quite controversial. Kim and Verrecchia (1991) predicted that trading volume increases with the precision of a public announcement. The information of the announcement is precise if it is close to the mutual agreement of the market expectation. Kim and Verrecchia (1991)’s prediction reflects the intuition that increased precision makes all traders more confident about their own opinion, encouraging greater speculative position and higher trading volume. It implies that if the prior dispersion of opinion is large and if the information of the announcement is precise, just before an announcement it converges, trading volume could be enormous. This scenario means that change in dispersion of opinion is negatively related with trading volume. Barron and Karpoff (2004) theoretically examined this relationship and found that the scenario may be true in a controlled experiment. Gillette, Stevens, Watts, Williams (1999), in their experimental study, documented positive relationship between trading volume and convergence of investors’ opinion after the announcement. However, in real world, trading cost may reverse the result. Barron and Karpoff (2004) modified Kim and Verrecchia (1991) and found that with considering trading cost trading volume could positively relate to the change in dispersion of opinion. This is consistent to the findings from previous empirical studies, Ziebart (1990) and Bamber, Barron and Stober (1997).

Lastly, opinion jumbling was predicted to be positively correlated with trading volume by theoretical work of Karpoff (1986). Karpoff (1986) constructed his model through a different structure. He assumed market agents into 2 groups; the stock holder and the potential buyer, and they are assigned different level of price expectation at the beginning. Karpoff (1986) allowed market agents to revise their expectation after received public signal. Price expectation of each market agents are reordered and then randomly paired which results to trade. His model predicted that the more market agents interpret public signal in different way, the more agents’ opinion is disorganized (or jumbled), and the more trading volume as the result. This is consistent with findings of empirical studies such as Barron (1995), Bamber, Barron and Stober (1997) and Li, Xie, Xu (2005).
Chapter 3

Theoretical and Conceptual Framework

This chapter lays the framework for hypothesis testing. It begins with elaborate explanation of how to derive each variable, then, links each variable together through a conceptualized map. After that it shows 3 hypotheses of this study and ends with the operationalization table.

3.1 Definition of Terms and Variables

This section is divided into 2 subsections
- Definition of abnormal trading volume
- Definition of differences of opinion

3.1.1 Definition of abnormal volume

The abnormal volume used in this study is the abnormal natural-log-transformed daily turnover. The following is a step-by-step elaboration and reasons.

There are 3 general measurements of trading volume. Quantity trading volume is the actual number of shares traded. Currency trading volume is the value of trading activity reported in currency term – which is mostly used by the media. Turnover is the fraction of outstanding shares traded. This study uses turnover as the trading volume because of its competitive features. It is unit-free thus facilitates cross-security comparison and it is insensitive to price fluctuation as the currency volume is. And it should be noted that value of turnover is between 0 and 1.

Ajinkya and Jain (1989) found that distribution of actual trading volume is highly skewed to the right. And they also found that abnormal trading volume calculated from raw actual volume is quite far from normal distribution. This would seem inappropriate to apply statistical tests based on normal theory. Therefore, they employed natural log
transformation to the raw trading volume and they found that distribution of natural-log-transformed turnover is quite close to normality. This study follows the natural-log-transformation method of Ajinkya and Jain (1989), Cready and Ramanan (1991), and Campbell and Wasley (1996). Thus the log-transformed volume is:

\[ LV_{it} = \ln(1 + V_{it}) \]  

equation-6

Where, \( LV_{it} \) is natural log transformed volume, \( V_{it} \) is actual trading volume. \( i \) stands for stock \( i \). And \( t \) is the time period which is the trading day in this study. The reason of adding 1 to the trading volume before transformation is to avoid taking log of zero and to yield the result higher than zero.

Since the volume used in this study is turnover ratio, then Ajinkya and Jain (1989) suggested the log transformation of turnover as

\[ LV_{it} = \ln(1 + S_{it})/\ln(1 + OS_{it}) \]  

equation-7

Where \( S_{it} \) is the number of shares traded on stock \( i \). \( OS_{it} \) is the number of shares outstanding.

Now, we have normally distributed transformed volume. Let us use it to find abnormal trading volume.

Dyl (1977) defined abnormal trading volume as the difference between actual volume and normal volume:

\[ Abnormal \ Volume = Actual \ Volume - Normal \ Volume, \ or \]  

\[ AV_{it} = V_{it} - E[V_{it}] \]  

equation-8

\( AV_{it} \) is abnormal volume, \( V_{it} \) is the actual volume, and \( E(V_{it}) \) is the expected value of actual volume, or in other word, normal volume. \( i \) represents stock \( i \). And \( t \) is the time period.

According to previous studies, the expected normal volume can be derived by 2 measures; company-specific model and market model (Tkac 1999).

In brief, the company-specific model calculates normal volume only from company specific data which is the mean of trading volume. It is used by a number of studies\(^{10}\). And the market model\(^{11}\) calculates normal volume from both company-specific


\(^{11}\) Harris and Gurel (1986), Lang, Litzenberger and Madrigal (1992), Lynch and Mendenhall (1996),
information and market-related information. It is very similar to CAPM’s market model. In simplest form, it uses OLS to estimate parameters (coefficients) in estimation period.

\[ V_{it} = a_i + b_i V_{mt} + e_i \]  

equation-9

Where, \( V_{it} \) is actual trading volume, \( V_{mt} \) is the contemporaneous market volume, \( a_i \) and \( b_i \) are the parameters and \( e_i \) is the residual.

So, the market model uses parameters from regressing equation 9 to derive expected normal volume as follows

\[ E[V_{it}] = a_i + b_i V_{mt} \]  

equation-10

Ajinkya and Jain (1989), Cready and Ramanan (1991) and Campbell and Wasley (1996) found that market model is more powerful than company-specific model to detect abnormality. However, they did not disprove that the company-specific model fails to detect abnormality.

This study chooses company-specific model (or mean model) to derive normal trading volume because it is sufficiently powerful, and easy to derive. Moreover, the SET is a thinly traded market. Zero trading volume can reduce reliability of expected normal trading volume derived from the parametric market model (equation-10).

And because actual raw trading volume seems inappropriate, then we use natural-log-transformed volume as in Ajinkya and Jain (1989). Then the normal log-transformed trading volume is:

\[ E[LV_{it}] = \frac{\sum_{t=1}^{246} \{\ln(1 + S_{it})/\ln(1 + OS_{it})\}}{246} \]  

equation-11

Where \( t \) is the trading day, \( t=0 \) is the earning announcement date. This means that the estimation window for normal trading volume is day -1 to day -246, trading days one year before the earning announcement date. This is consistent to Bamber, Barron and Stober (1997).

Therefore according to equation-8 the abnormal trading volume is:

\[ ALV_{it} = LV_{it} - E[LV_{it}] \]

\[ ALV_{it} = \ln(1 + S_{it})/\ln(1 + OS_{it}) - \frac{\sum_{t=1}^{246} \{\ln(1 + S_{it})/\ln(1 + OS_{it})\}}{246} \]  

equation-12
The $ALV_{it}$ (abnormal log-transformed volume) is estimated within 3 days window on and after earning announcement, day 0 to day 2, $\tau = 0,1,2$. While $E(LV_{it})$ (normal log-transformed volume) is estimated from a fixed window of 246 days before the announcement, day -1 to day -246 – consistent with Bamber, Barron and Stober (1997).

As a result $ALV_{it}$, abnormal log-transformed volume, used in the hypothesis testing is the summation of $ALV_{it}$, where $\tau = 0,1,2$.

### 3.1.2 Definition of differences of opinion

The ideal differences of opinion should be calculated from market opinion which is the aggregate opinion of all market participants. Such data is unavailable. Previous researchers employ proxy for market opinion. This study uses analysts’ target price as the proxy for market opinion due to its richer information content (Au, Asquith & Mikhail, 2005). There are 3 measures of differences of opinion in this study.

- Prior dispersion of opinion
- Change in dispersion of opinions
- Opinion jumbling

#### 3.1.2.a Prior dispersion of opinion

It is the degree of disagreement of market participants before an informative event. This study proxies it by the degree of dispersion of analysts’ opinion on target price before an earning announcement. This study uses coefficient of variation ($CV$) to measure the dispersion because it facilitates cross-security comparison. $CV$ is defined as the ratio of the standard deviation ($\sigma$) to the mean ($\mu$). Thus,

$$
\mu_i^b = \frac{\sum_{a=1}^{n} TP_{ia}^b}{n},
$$

$$
\sigma_i^b = \sqrt{\frac{1}{n} \sum_{a=1}^{n} \left( TP_{ia}^b - \mu_i^b \right)^2},
$$

$$
CV_i^b = \frac{\sigma_i^b}{\mu_i^b}
$$

equation-13
Where \( TP_{ia} \) stands for target price forecast of analyst \( a \) on stock \( i \). \( b \) stands for before earning announcement. \( n \) stands for the number of analyst.

All \( CV_i^b \) used in this study is selected from the stock which has at least 3 analysts follow 90 calendar days before and also after the announcement date \((n \geq 3)\), this is due to scarcity of target price data.

Nevertheless, \( CV \) of target price was found to be rightly skewed by Brav and Lehavy (2003). This study uses method of log transformation as in Bamber, Barron and Stober (1997) to make it normally distributed. Thus, the log-transformed prior dispersion of opinion \((LDISP)\) is

\[
LDISP_i = \ln(0.0001 + CV_i^b)
\]
equation-14

Addition of 0.0001 before transformation is to avoid taking log of zero.

### 3.1.2.b Change in dispersion of opinions

Change in dispersion of opinion is the difference of opinion dispersion before and after an informative event. This study uses coefficient of variation \((CV)\), similar to the one used in 3.1.3.a, to measure the degree of opinion dispersion before and after informative event. Then it can be written as

\[
\Delta DISP_i = CV_i^a - CV_i^b,
\]

\[
CV_i^b = \frac{\sigma_i^b}{\mu_i^b},
\]
equation-15

\[
CV_i^a = \frac{\sigma_i^a}{\mu_i^a}
\]

Where \( CV_i^a \) is coefficient of variation of stock \( i \), and \( a \) stands for \( after \) which is 90 calendar days after earning announcement, or day 0 to day 89. \( CV_i^b \) is coefficient of variation of stock \( i \), 90 calendar days \( before \) earning announcement, or day -1 to day -90. \( CV_i^a \) and \( CV_i^b \) must be calculated from the same set of analyst with at least 3 analysts.

Because there’s no evidence of departure from normal distribution of \( \Delta DISP_i \) from previous study (Bamber, Barron & Stober, 1997). It is directly used in the hypothesis testing without transformation.
3.1.2.c Opinion jumbling

During an informative event like earning announcement, analysts usually revise their opinion. The market can observe this revision from the revised target price. Opinion jumbling tells how jumbling/disordering the rank (or relative position) among analysts’ opinion rearranges during the opinion revision.

Supposed that the opinion revision is not jumbling, this means that the rank (or relative position) of analysts’ opinion before and after revision is unchanged. The analyst, who initially thinks the stock is expensive, still thinks that it is expensive. The analyst, who initially thinks the stock is cheap, still thinks that it is cheap, relatively to the group’s consensus. And if the opinion revision is jumbling, the ranking (or relative position) of analysts’ opinion before and after revision may change a lot. The degree of jumbling is the differences of opinion derived directly from the theoretical work of Karpoff (1986).

Opinion jumbling of this study is calculated by the method of Barron (1995). Analysts’ target price revision is used as proxy for market opinion revision. The revision must be from the same brokerage house; otherwise, the case is dropped. Target price before revision is the target price in analysts’ report 90 calendar days before earning announcement, day -1 to day -90. Revised target price is the target price in analysts’ report 90 calendar days after the announcement, day 0 to day 89.

The target price before revision and the revised target price of the same analyst are paired. There must be no lesser than 3 pairs of revision, or the case is dropped. The small number of minimum pairs due to scarcity of data is a necessary inaccuracy. This low number of paired revision is equal to Stickel (1993) which also faced similar data constraint like this study.

And Pearson’s $r$ correlation coefficient is used to derive degree of jumbling. The reason to use Pearson’s $r$ is because Pearson’s $r$ captures more form disagreement than either Spearman’s rho or the proportion of paired forecast that cross/flip – this is the direct use from study of Bamber, Barron and Stober (1995). Thus opinion jumbling is,

$$ JUMB_i = 1 - r_i $${equation-16}

The degree of opinion jumbling ($JUMB$) of stock $i$ is equal to 1 minus Pearson’s $r$ to make it a positive number.
Of course, $1 - r_t$ has a tendency to be skewed to the right. And in order to be consistent to Barron (1995), this study applies log transformation to adjust $JUMB_t$ before using in hypothesis testing.

$$LJUMB_t = \ln(1.1 - r_t)$$  \text{equation-17}

The addition of 0.1 to the equation is to avoid taking log of zero.

### 3.2 Conceptual Framework

**Figure 3.1**: Conceptualized map of inter-variable relationship.

The above map shows relationship between dependent variable, trading volume, and independent variables, differences of opinion. The independent variable is divided into 3 sub-variables; prior dispersion of opinion, change in dispersion of opinion and opinion jumbling. These 3 sub-variables are hypothesized to have positive relationship with the independent variable, abnormal trading volume.
3.3 Research Hypothesis

This study investigates relationship between 3 measurements of differences of opinion and abnormal trading volume. Therefore, there are 3 hypotheses in this study.

**Hypothesis 1: Prior dispersion of opinion**

$H_0$: There is no positive relationship between abnormal trading volume and prior dispersion of opinion.

$H_1$: There is positive relationship between abnormal trading volume and prior dispersion of opinion.

**Hypothesis 2: Change in dispersion of opinion**

$H_0$: There is no positive relationship between abnormal trading volume and change in dispersion of opinion.

$H_1$: There is positive relationship between abnormal trading volume and change in dispersion of opinion.

**Hypothesis 3: Opinion jumbling**

$H_0$: There is no positive relationship between abnormal trading volume and opinion jumbling.

$H_1$: There is positive relationship between abnormal trading volume and opinion jumbling.
3.4 Operationalization of Variables

Table 3.1: Operationalization of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Operationalization</th>
<th>Measurement scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main</strong></td>
<td><strong>Sub</strong></td>
<td></td>
</tr>
<tr>
<td>Trading volume</td>
<td>Abnormal log-transformed trading volume.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( ALV_{it} = LV_{it} - E[LV_{it}] )</td>
<td>Interval</td>
</tr>
<tr>
<td>Differences of opinion</td>
<td>Log-transformed prior dispersion of opinion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( LDISP_i = \ln(0.0001 + CV_i^a) )</td>
<td>Interval</td>
</tr>
<tr>
<td></td>
<td>Change in dispersion of opinion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \Delta DISP_i = CV_i^a - CV_i^b )</td>
<td>Interval</td>
</tr>
<tr>
<td></td>
<td>Log-transformed opinion jumbling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( LJUMB_i = \ln(1.1 - r_i) )</td>
<td>Interval</td>
</tr>
</tbody>
</table>

Dependent variable is trading volume. Independent variables are differences of opinion. The step-by-step explanation of how to derive each variable and its reason is provided in section 3.1 Definition of Terms and Variables.
Chapter 4

Research Methodology

This chapter explains how data of variables in chapter 3 is collected and analyzed. It begins by telling what research method is used, sample size of data, instrument of collecting data, how to collect the data and ends with how to apply statistical treatment to the data.

4.1 Method of research used

This study is a relational research. This empirical study collects the secondary data of trading volume from SET and data of analysts’ target price from analysts’ reports. Statistical analysis on quantitative data is used to infer the hypothesized relationships between variables.

4.2 Sampling Procedure

The target population of this study is the total number of all listed stock in the SET which is 490, as of 22\textsuperscript{nd} October 2007. The sampling frame is identical to the population, and the unit of analysis is stock.

However, the sample size of the study is lesser than size of population, this due to the fact that not all element of population possesses satisfactory qualities suitable for hypothesis testing. In other word, because some stocks do not have enough necessary information which is the opinion of analysts, thus they cannot be used in statistical testing.

The only screening criterion is – the selected stock must have at least 3 analysts’ target price forecasts within 90 calendar days before the earning announcement, and must have at least 3 target price forecasts from the same group of analysts 90 calendar days
from the announcement. According to the previous study (Stickel 1993), 3-pair of analyst is the minimum pair used to derive the independent variable. 90-calendar-day is the maximum number of days in a quarter. The collection window of 90-calendar-day before and after a quarterly announcement allows this study to collect maximum number of analysts’ forecasts around a quarterly announcement. This study uses the loosest criterion in order to have the highest number of sample size.

The criterion shrinks the possible sample size to 71 stocks.

4.3 Research Instrument

This study does not use questionnaire to collect the data. Observation method is used instead to obtain recorded data of trading volume and target price. Besides necessity to use this method, there are some advantages of this method. Firstly, it can capture the whole event in its true natural settings. Secondly, the observation is unobtrusive. Traders and analysts are unaware that they are being observed; as the result, the data collected has no respondent bias.

4.4 Collection of Data

The collection of historical daily trading volume data from 2nd May to 31st October 2007, i.e. turnover, is purchased from setsmart.com.

The collection of analysts’ target price is directly obtained by downloading analysts’ reports available online on settrade.com from 2nd May to 31st October 2007. This is due to 2 reasons; validity and availability of data.

There are many approaches to acquire analysts’ report on SET: the direct acquisition from each and every brokerage house, by purchasing from information providers like Bloomberge Terminal or Thompson One’s First Call, or through I/B/E/S academic service, or other free services like maruey.com or settrade.com.

The direct acquisition from each and every brokerage house is impossible because it is hard to persuade every brokerage house to agree giving their private information at the same time. This substantial search cost discourages any market participant to acquire target price information this way as well, therefore it cannot represent the market opinion.
All analysts’ reports on SET from Bloomberg Terminal or Thompson One’s First Call is pretty the same set of I/B/E/S. I/B/E/S stands for Institutional Brokers Estimate System, a commercial service currently owned by Thompson Financial which is a central location whereby investors are able to search different analyst estimates for any given stock without necessarily searching for each individual analyst. At present, I/B/E/S covers over 18,000 companies in 60 countries including Thailand. More than 850 brokerage houses contribute data to I/B/E/S, from the largest global houses to regional and local brokers. Lonkani, Khantavit, Chunahachinda (2006) stated that most analysts’ estimates on SET in I/B/E/S database are from foreign brokerage houses. In fact, analysts’ reports retrievable from Bloomberg Terminal are not in Thai language but English or Chinese. And this prestigious information is at a very high price. These are the reasons why analysts’ report from global information providers may not be a good representative of Thai market opinion.

Maruey.com is the website of SET’s Maruey library. Analysts’ reports digitally stored in the library are in 2 places: the CDs and the website. The CDs are produced annually by SAA-Thai, securities analysts association of Thailand. The CDs does not contain each and every report of an individual analyst during a year, but it is the annual summary of all reports by the analyst made into one. It cannot provide the information how an analyst revises his own opinion during the year.

Another digitally archived analysts’ reports are all available at Maruey library’s website. This free source of information has analysts’ reports from 8 brokerage houses from January 2006 to present. It may be a rich source of free information for in-depth research. But it may not be suitable for this study of the market opinion which requires broader array of data.

The last resort of data is settrade.com. Settrade.com is the most popular information provider for domestic investors, because it is free and it is officially established by SET as a not-for-profit organization to supply the market with public information. Settrade.com receives analysts’ report via cooperation with SAA-Thai on SAA Consensus project. The SAA-Thai has agreements with its brokerage house members to use and evaluate performance of their reports. There are currently 49 brokers registered in SET. On a voluntary basis, only 28 brokers regularly send their analysts’
report to the SAA-Thai, and around half of them actively issue analysts’ reports. Immediately, SAA-Thai sends these reports to settrade.com to calculate SAA-Consensus which is the summary page of important statistics from every broker on each stock. These important statistics are analysts’ forecasts on net profit, EPS, P/E, dividend, target price and analysts’ recommendation.

Under agreement between SAA-Thai and its members, SAA-Thai has right to disclose information of its member only of what presently appear on SAA Consensus page. But the historical summary data of SAA Consensus is not allowed for research purpose, except the analysts’ reports downloadable from settrade.com which will appear online only for 6 months after its first appearance. These reports are in PDF format. It is online on settrade.com almost the same time of its issuance. Only few brokers submit their reports few days later. Because SAA Consensus is publicly available, it is a reliable source and represents opinion of most prominent brokerage houses. It is possible that most market participants would use SAA Consensus as the main source of information. This study, therefore, uses it as representative of market opinion.

This study retrieves analysts’ report from settrade.com which is the same set of reports in SAA Consensus. And manually, report-by-report collects the data of target price. The study uses the appearance date when the report was online as the date which the market learns, not the real issuance date specified in the report, because most market participants can actually access the report that time. Target price appears on an analyst report may have many name; target price, fair price, fair value, or objective price. This study regards these names as of the same meaning as defined by SAA-Thai; the value of stock measured fundamentally for the next 12 months, no matter how the brokerage houses claim that their definitions are different from the rest, this due to ambiguity of the definitions.

There are 2,403 target price forecasts collected from 2,559 reports and 217 numbers of stocks followed by 29 brokerage houses.

4.5 Statistical Treatment of Data

Unlike the previous study who uses panel analysis to infer relationship between trading volume and differences of opinion, Bamber, Barron and Stober (1997). This study
uses simple cross-sectional data instead, this due to scarcity of multi-period data. Thus
the multi-variable regression is

\[ ALV_i = \alpha + \beta_1 LDISP_i + \beta_2 \Delta DISP_i + \beta_3 LJUMB_i + e_i \]  

\text{equation-18}

\( ALV_i \) is abnormal log-transformed trading volume. It is the main dependent variable. \( i \)
stands for stock \( i \).

\( \alpha, \beta_1, \beta_2, \beta_3 \) are regression parameters, \( e_i \) is error term.

\( LDISP_i \) is log-transformed prior dispersion of opinion

\( \Delta DISP_i \) is change in dispersion of opinion

\( LJUMB_i \) is log-transformed opinion jumbling

\( LDISP_i, \Delta DISP_i, LJUMB_i \) are deterministic dependent variables.

Statistical significance of the regression is checked by global F-test for overall fit
and individual t-tests (one-tailed) for each parameter. The goodness of fit is checked by
adjusted R-squared. And in order to check whether the regression is valid or not, the
model is also checked for validity of underpinning assumption of regression analysis.
Chapter 5

Data Presentation and Critical Discussion of Results

This chapter presents the raw data, filtering of data, then, justification of the data to exclude outliers. The result of this process is the input into regression analysis. There is the interpretation at the end of the regression results. This chapter ends with the validation of regression’s underpinning assumptions.

5.1 Descriptive Statistics

Table 5.1: Number of brokers, reports issued and company followed

<table>
<thead>
<tr>
<th>BROKER</th>
<th>Reports Issued</th>
<th>Company Followed</th>
<th>Ratio</th>
<th>BROKER</th>
<th>Reports Issued</th>
<th>Company Followed</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIMENG</td>
<td>333</td>
<td>126</td>
<td>2.64</td>
<td>KKS</td>
<td>7</td>
<td>6</td>
<td>1.17</td>
</tr>
<tr>
<td>AYS</td>
<td>293</td>
<td>105</td>
<td>2.79</td>
<td>KTBS</td>
<td>4</td>
<td>3</td>
<td>1.33</td>
</tr>
<tr>
<td>SCIIBS</td>
<td>210</td>
<td>77</td>
<td>2.73</td>
<td>PHILLIP</td>
<td>4</td>
<td>3</td>
<td>1.33</td>
</tr>
<tr>
<td>BLS</td>
<td>202</td>
<td>78</td>
<td>2.59</td>
<td>BFIT</td>
<td>2</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>US</td>
<td>183</td>
<td>87</td>
<td>2.10</td>
<td>CNS</td>
<td>2</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>TRINITY</td>
<td>168</td>
<td>59</td>
<td>2.81</td>
<td>IVG</td>
<td>2</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>GLOBLEX</td>
<td>153</td>
<td>84</td>
<td>1.82</td>
<td>SEAMICO</td>
<td>2</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>BT</td>
<td>152</td>
<td>52</td>
<td>2.92</td>
<td>AIIRA</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>SSEC</td>
<td>140</td>
<td>61</td>
<td>2.30</td>
<td>ASL</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>KGI</td>
<td>126</td>
<td>59</td>
<td>2.14</td>
<td>BSEC</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>ASP</td>
<td>121</td>
<td>90</td>
<td>1.34</td>
<td>PSS</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>ACLS</td>
<td>114</td>
<td>42</td>
<td>2.71</td>
<td>SYRUS</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>UOBKHST</td>
<td>95</td>
<td>54</td>
<td>1.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FINANSA</td>
<td>66</td>
<td>49</td>
<td>1.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THANACHART</td>
<td>19</td>
<td>15</td>
<td>1.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>2,403</strong></td>
<td><strong>217</strong></td>
<td><strong>11.07</strong></td>
</tr>
</tbody>
</table>

source: settrade.com

There are 27 brokers sending their report to the Securities Analysts Association of Thailand, SAA-Thai, on the voluntary basis. All analysts’ reports are collected during 2\textsuperscript{nd} May 2007 to 31\textsuperscript{st} October 2007, a 6 months period. KIMENG issued the highest number of reports and also followed highest number of companies. Top 12 brokers issued more
than 100 reports on more than 50 followed companies. On average, there are more than 2 reports per a company. The total number of reports collected is 2,403 reports, on 217 companies, on average, there are 11 reports per a company. It should be noted that the actual number of collected reports are 2,559 reports. The missing 156 reports are reports based on technical analysis. They are not consistent to the definition of SAA-Thai, thus excluded from the database.

Table 5.2: Reports issued between May to October 2007: clustering pattern

<table>
<thead>
<tr>
<th>Month</th>
<th>Reports Issued</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAY</td>
<td>515</td>
<td>Most 1\textsuperscript{st} quarter interim announcement falls on this month</td>
</tr>
<tr>
<td>JUN</td>
<td>293</td>
<td></td>
</tr>
<tr>
<td>JUL</td>
<td>389</td>
<td></td>
</tr>
<tr>
<td>AUG</td>
<td>558</td>
<td>Most 2\textsuperscript{nd} quarter interim announcement falls on this month</td>
</tr>
<tr>
<td>SEP</td>
<td>258</td>
<td></td>
</tr>
<tr>
<td>OCT</td>
<td>390</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>2,403</td>
<td></td>
</tr>
</tbody>
</table>

Mostly, reports issued are clustered around the announcement date. The pattern is somewhat predictable; reports are few after the preceding announcement date, then, gradually increase and peak at the month of following announcement. The number of reports peaked in the announcement month is almost double of the following month.
**Figure 5.1**: Company’s interim announcement date: clustered around 14 Aug 2007

The pattern of company’s interim announcement date is as the figure above. They are clustered around 14 August, because it is the last day the company’s interim report must be submitted to the SET. However, it can be observed that a number of companies submit their reports in July. They are mostly financial companies, i.e. banks or brokers, which usually submit their first unapproved interim reports to the SET a month earlier. The right long tail of the figure are mostly companies those submitted their report behind the schedule. Only exceptional case is KSL, which its fiscal year end is 31\textsuperscript{st} October, has the real interim announcement date on 14\textsuperscript{th} September 2007.

**Table 5.3**: Number of reports categorized by its comparative issuance date

<table>
<thead>
<tr>
<th>Day of issuance comparing to the announcement date</th>
<th>Number of reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>before day -90</td>
<td>154</td>
</tr>
<tr>
<td>from day -61 to day -90</td>
<td>464</td>
</tr>
<tr>
<td>from day -31 to day -60</td>
<td>246</td>
</tr>
<tr>
<td>from day -1 to day -30</td>
<td>363</td>
</tr>
<tr>
<td>from day +0 to day +29</td>
<td>582</td>
</tr>
<tr>
<td>from day +30 to day +59</td>
<td>217</td>
</tr>
<tr>
<td>from day +60 to day +89</td>
<td>285</td>
</tr>
<tr>
<td>after day +90</td>
<td>92</td>
</tr>
<tr>
<td>Grand Total</td>
<td>2,403</td>
</tr>
</tbody>
</table>
Table 5.3 shows the number of reports according to its issuance date. The issuance date presented is not the calendar date but the day comparing to the actual announcement date. We can see the clearer pattern of report issuance comparing to the previous table. The reports were issued in lowest number 2 months before the announcement. The number was greater in the following month, and peaked at the month following the announcement. And the number of report in the peaked month is more than double of the lowest month.

However, this study uses the report between day -90 and day +89, 90 days before and after the announcement date. Therefore, there are 244 reports excluded from the database with 2,157 remains.

**Figure 5.2:** Number of reports on its comparative issuance date: peaked on day 1

![Figure 5.2](image)

Figure 5.2 gives clearer details of report issuing pattern. From day -60 to day -31, the reports were lightly issued. Day -30 to day -1, the reports were thicker issued, noted that reports were particularly few a week before day 0, or the announcement date.

On day 1, one day after the announcement date, we can observe the outburst of report as high as 123. This outburst of report issuance lasted around 5 days after the announcement date with the average report of over 50 reports a day.

This unusual pattern could be concluded that the announcement of company’s interim earning may release some information to the public.
The reason that reports are lower around day -90 and day +90 is that this study collects data focusing on day 0, and with a collection window of around 180 days, therefore, large number of the report around day -90 and day +90 may not be included.

**Figure 5.3**: Number of company on different level of following report: a large number of companies have below 6 reports

Figure 5.3 shows the number of company which has the reports between 2nd May and 31st October 2007. A large number of them have below 6 reports. And the number of company with higher number of report reduces gradually.

According to the selection criterion, the stock/company which can be selected in the sample must have at least 3 pairs of reports from the same analysts. A pair is made of one report before the announcement date, day -90 to day -1, and another report after the announcement, day 0 to day +89.

**Table 5.4**: Number of stock at different level of report paired

<table>
<thead>
<tr>
<th>Number of Pair</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Stock</td>
<td>78</td>
<td>44</td>
<td>24</td>
<td>19</td>
<td>15</td>
<td>11</td>
<td>10</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>217</td>
</tr>
</tbody>
</table>

Table 5.4 shows the number of stock at different level of pair. There are 71 stocks with at least 3 pairs of report before and after announcement from the same analysts.
There are 146 stocks excluded from the consideration because it has lower than 3 pairs of report.

**Figure 5.4**: Histogram of average daily turnover ratio of sampled stock

![Average Daily Turnover Ratio of Stocks in the Sample](source: setsmart.com)

The raw average daily turnover ratio of stocks in the sample. It has a thin shooting head and long tail. Few stocks are heavily traded comparing to the majority of stocks. This may evidence the necessity of using abnormal volume. Companies with large trading volumes may dominate the cross-security analysis, and distort the results. Usage of abnormal volume eliminates this possibility, Dyl (1977).

### 5.2 Justification of Data: Removing Outliers

There are 1 dependent variable and 3 independent variables in the multivariate regression of this study. And it may be useful to repeat the brief definition of the 4 variables again.

- $ALV_i$ is a dependent variable. It is the abnormal trading volume of stock $i$, accumulated for 3 days from the interim earning announcement date. Abnormality is observed by actual trading volume which departs from normality of past annual mean volume. It is natural log transformed before calculating abnormality.
- $LDISP_i$ is an independent variable. It is dispersion of analysts’ opinion on stock $i$, before the earning announcement. It is measured by log transformation of coefficient of variation of analysts’ target price 90 calendar days before the announcement.

- $ΔDISP_i$ is an independent variable. It is degree of dispersion of analysts’ opinion revision on stock $i$, before and after the announcement. It is the coefficient of variation of analysts’ target price 90 days after announcement minus coefficient of variation before the announcement; the target price revision must be from the same set of analyst of at least 3 analysts.

- $LJUMB_i$ is an independent variable. It is degree of jumbling of analysts’ opinion revision on stock $i$, before and after the announcement. It is the log transformation of Pearson’s correlation coefficient estimated from target price of analysts 90 days before and after the announcement date. The target price must be from the same set of analyst of at least 3 analysts.

After obtaining raw data of actual trading volume and target price, they are transformed according to the definitions above and this is the descriptive statistics of the variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$ALV_i$</th>
<th>$LDISP_i$</th>
<th>$ΔDISP_i$</th>
<th>$LJUMB_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.069340</td>
<td>-2.406880</td>
<td>-0.031420</td>
<td>-0.857130</td>
</tr>
<tr>
<td>Median</td>
<td>0.059378</td>
<td>-2.395270</td>
<td>-0.011220</td>
<td>-0.722010</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.118424</td>
<td>0.591443</td>
<td>0.148038</td>
<td>0.974791</td>
</tr>
<tr>
<td>Variance</td>
<td>0.014024</td>
<td>0.349805</td>
<td>0.021915</td>
<td>0.950218</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>5.039478</td>
<td>5.809415</td>
<td>58.816420</td>
<td>-1.378370</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.260490</td>
<td>0.667652</td>
<td>-7.336930</td>
<td>-0.077970</td>
</tr>
<tr>
<td>Range</td>
<td>0.829954</td>
<td>4.476135</td>
<td>1.309066</td>
<td>3.038166</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.262020</td>
<td>-4.235030</td>
<td>-1.207090</td>
<td>-2.302590</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.567938</td>
<td>0.241109</td>
<td>0.101972</td>
<td>0.735581</td>
</tr>
<tr>
<td>Count</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
</tr>
</tbody>
</table>

With the sample size of 71 stocks, opinion jumbling ($LJUMB_i$) seems to be normally distributed; abnormal volume ($ALV_i$) and prior dispersion ($LDISP_i$) also seem to be near normal. However, change in dispersion ($ΔDISP_i$) does not seem to be normally distributed because it is highly skewed, -7.33, and has high kurtosis, 58.816. According to previous studies (Au, Asquith & Mikhail 2005), change in dispersion ($ΔDISP_i$) should be normally distributed. There should be a number of possible causes of this
phenomenon; wrong meaning of target price used, or change in dispersion ($\Delta\text{DISP}_i$) may have non-normal distribution, or it may have the outlier problem.

The target price used in this study is the target price which is nearest to the earning announcement. Consider the target price forecast of a broker, Kimeng, on a stock, Banpu, as follows

<table>
<thead>
<tr>
<th>Issuance Date</th>
<th>Time</th>
<th>Comparison to announcement date</th>
<th>Announcement date</th>
<th>Target Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>14/5/2007</td>
<td>14:56</td>
<td>-88 days before</td>
<td>10/8/2007</td>
<td>193</td>
</tr>
<tr>
<td>19/6/2007</td>
<td>10:52</td>
<td>-52 days before</td>
<td>10/8/2007</td>
<td>278</td>
</tr>
<tr>
<td>9/7/2007</td>
<td>09:06</td>
<td>-32 days before</td>
<td>10/8/2007</td>
<td>278</td>
</tr>
<tr>
<td>20/8/2007</td>
<td>08:44</td>
<td>10 days after</td>
<td>10/8/2007</td>
<td>296</td>
</tr>
<tr>
<td>19/9/2007</td>
<td>09:24</td>
<td>40 days after</td>
<td>10/8/2007</td>
<td>324</td>
</tr>
</tbody>
</table>

source: settrade.com

Intuitively, the target price used in the calculation should be the ones which are nearest to the announcement date (bold). However, because the previous studies, Bamber Barron and Stober (1997), Au, Asquith and Mikhail (2005), did not clearly specify the target price used, it is possible that they may use the farthest target price (bold and italic) from the announcement. The following table shows descriptive statistics of variables derived from the farthest target price.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$\text{ALV}_i$</th>
<th>$\text{LDISP}_i$</th>
<th>$\text{ADISP}_i$</th>
<th>$\text{LJUMB}_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.069340</td>
<td>-2.420170</td>
<td>-0.018850</td>
<td>-0.497930</td>
</tr>
<tr>
<td>Median</td>
<td>0.059378</td>
<td>-2.399970</td>
<td>-0.003160</td>
<td>-0.235770</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.118424</td>
<td>0.595879</td>
<td>0.100792</td>
<td>0.876428</td>
</tr>
<tr>
<td>Variance</td>
<td>0.014024</td>
<td>0.355071</td>
<td>0.010159</td>
<td>0.768125</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>5.039478</td>
<td>2.440082</td>
<td>33.320490</td>
<td>-0.593050</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.260490</td>
<td>0.136191</td>
<td>-4.874000</td>
<td>-0.731300</td>
</tr>
<tr>
<td>Range</td>
<td>0.829954</td>
<td>3.984709</td>
<td>3.043257</td>
<td>2.302590</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.262020</td>
<td>-4.235030</td>
<td>-0.718330</td>
<td>-2.302590</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.567938</td>
<td>-0.250320</td>
<td>0.114281</td>
<td>0.740672</td>
</tr>
<tr>
<td>Count</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
</tr>
</tbody>
</table>

The problem of non-normality of change in dispersion ($\Delta\text{DISP}_i$) still remains. It is still highly skewed to the left, -4.87, and has kurtosis of 33.32. The two specifications of target price yield similar results. It can be concluded that the meaning of target price may
not be the cause of this phenomenon. This study still uses the intuitive meaning of target price nearest to the announcement date in the analysis.

**Figure 5.5:** Histogram of $\Delta DISP_i$ plotted with normal curve

![Histogram of $\Delta DISP_i$ plotted with normal curve](image)

Histogram (figure 5.5) is frequency of change in dispersion ($\Delta DISP_i$) plotted comparing to normal curve. It shows that change in dispersion ($\Delta DISP_i$) is negatively skewed with very high kurtosis. There is no obvious pattern of other kinds of distribution. This signals that there may be an unusual outlier data.

The outlier can be due to limitation of the model to explain all data – some special data may deviate from the rest because of unknown variables. However, a small number of outlier is expected in normal distribution.

The outlier could mislead the estimates of the regression analysis which is based on assumption of normal distribution.

The followings are process of identifying and removing the outliers to prepare the proper data for the analysis.

Firstly, regressing $ALV_i$, the dependent variable, on the independent variables; $LDISP_i$, $\Delta DISP_i$, and $LJUMB_i$ – with the same specification of the actual test.

$$ALV_i = \alpha + \beta_1 LDISP_i + \beta_2 \Delta DISP_i + \beta_3 LJUMB_i + e_i$$  \text{equation-18}
The initial result of the test regression is

**Table 5.8: Result of test regression: for detecting outliers**

<table>
<thead>
<tr>
<th></th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.144030</td>
<td>0.073292</td>
<td>-1.965170</td>
<td>0.053542</td>
</tr>
<tr>
<td>$LDISP_i$</td>
<td>-0.087590</td>
<td>0.028587</td>
<td>-3.063950</td>
<td>0.003145</td>
</tr>
<tr>
<td>$\Delta Disp_i$</td>
<td>-0.449750</td>
<td>0.114467</td>
<td>-3.929050</td>
<td>0.000204</td>
</tr>
<tr>
<td>$LJUMB_i$</td>
<td>0.013508</td>
<td>0.013265</td>
<td>1.018299</td>
<td>0.312199</td>
</tr>
</tbody>
</table>

Adjusted R-square = 17.13%, with F-stat of 5.82 (significance F = 0.001344)

The result is significant, F-ratio is 5.82. However, it predicts wrong sign of prior dispersion ($LDISP_i$), and change in dispersion ($\Delta Disp_i$) which should be positively correlated with abnormal volume ($ALV_i$).

Secondly, plotting the standardized residuals from above result with each independent variable.

**Figure 5.6: Plot of residuals with 3 independent variables: there are outliers**
From the dDISP residual plot, we can observe an unusual outlier (round dot) which is data of stock SVI. The data of stock SVI is also an outlier in the LDISP residual plot (round dot). As a by-product, the outlier data of stock OISHI (triangle dot) and PSL (rectangular dot) are also excluded from the database.

Table 5.9, after the deletion of 3 outliers the descriptive statistics of 4 variables seems satisfactory.
Table 5.9: Descriptive statistics of variables after removing outliers

<table>
<thead>
<tr>
<th>Variables</th>
<th>$ALV_i$</th>
<th>$LDISP_i$</th>
<th>$\Delta DISP_i$</th>
<th>$LJUMB_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.056184</td>
<td>-2.397460</td>
<td>-0.015720</td>
<td>-0.828650</td>
</tr>
<tr>
<td>Median</td>
<td>0.051593</td>
<td>-2.381140</td>
<td>-0.011830</td>
<td>-0.695990</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.094375</td>
<td>0.423087</td>
<td>0.043751</td>
<td>0.963506</td>
</tr>
<tr>
<td>Variance</td>
<td>0.008907</td>
<td>0.179002</td>
<td>0.001914</td>
<td>0.928344</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.170886</td>
<td>-0.377380</td>
<td>1.074684</td>
<td>-1.341400</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.014340</td>
<td>-0.060300</td>
<td>-0.193280</td>
<td>-0.097450</td>
</tr>
<tr>
<td>Range</td>
<td>0.581208</td>
<td>1.820742</td>
<td>0.232300</td>
<td>3.038166</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.262020</td>
<td>-3.232220</td>
<td>-0.130330</td>
<td>-2.302590</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.319192</td>
<td>-1.411470</td>
<td>0.101972</td>
<td>0.735581</td>
</tr>
<tr>
<td>Count</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>68</td>
</tr>
</tbody>
</table>

Mean of each variable is quite near to its median. Change in dispersion ($\Delta DISP_i$) is now nearer to normal distribution. Abnormal trading volume ($ALV_i$) has kurtosis and skewness of 2.170 and -0.014 which is very near to normal distribution. It can be concluded that the stochastic dependent variable is normally distributed. And kurtosis and skewness of other variables also fall within satisfactory range.

Figure 5.7: Histogram of $\Delta DISP_i$ frequency after removing outliers: nearer to normal distribution

Histogram (figure 5.7) shows that after the deletion of outliers, $\Delta DISP_i$ is distributed nearer to normal distribution. The justified database should be more proper for hypothesis testing.
5.3 Hypothesis Testing

After justification of data, the hypothesis of this study is tested with this model specification

\[ ALV_i = \alpha + \beta_1 LDISP_i + \beta_2 \Delta DISP_i + \beta_3 LJUMB_i + e_i \]  

equation-18

The regression is run on SPSS and the followings are results from SPSS.

Table 5.10: SPSS result of regression analysis: low significant F and adjusted R-square

<table>
<thead>
<tr>
<th>Variables Entered/Removed(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable Entered</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

a  All requested variables entered.
B  Dependent Variable: ALV

Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.324(a)</td>
<td>.105</td>
<td>.063</td>
<td>.0913612000 38620</td>
</tr>
</tbody>
</table>

a  Predictors: (Constant), LJUMB, dDISP, LDISP

ANOVA(b)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>.063</td>
<td>3</td>
<td>.021</td>
<td><strong>2.498</strong></td>
</tr>
<tr>
<td>Residual</td>
<td>.534</td>
<td>64</td>
<td>.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>.597</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a  Predictors: (Constant), LJUMB, dDISP, LDISP
b  Dependent Variable: ALV

Coefficients(a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>.116</td>
<td>.083</td>
<td>1.396</td>
</tr>
<tr>
<td></td>
<td>LDISP</td>
<td>.013</td>
<td>.032</td>
<td>.058</td>
</tr>
<tr>
<td></td>
<td>dDISP</td>
<td>.447</td>
<td>.309</td>
<td>.207</td>
</tr>
<tr>
<td></td>
<td>LJUMB</td>
<td>.026</td>
<td>.012</td>
<td>.266</td>
</tr>
</tbody>
</table>

a  Dependent Variable: ALV
First of all, it should be noted that the significance F of this model specification is 0.068 slightly higher than the accepted level of significant of 0.05. This means that, at the level of significant of 0.05, we have to accept the hypothesis that $\beta_1 = \beta_2 = \beta_3 = 0$. Or in other word, there is 6.8% of the occurrence that the independent variables cannot explain dependent variable. By the above model specification, the low significant F denies all hypothesis of this study. However, by the stepwise method in SPSS, the SPSS excluded prior dispersion of opinion ($LDisp_i$) and change in dispersion of opinion ($ADISP_i$) from the model specification\(^\text{12}\). It means that only the hypothesis of prior dispersion ($LDisp_i$) and change in dispersion of opinion ($ADISP_i$) are denied to have positive relationship with abnormal trading volume\(^\text{13}\) – only hypothesis of opinion jumbling ($LJumb_i$) is accepted to have positive relationship with abnormal trading volume\(^\text{14}\).

However, let us temporary relax this significance level of F-stat and try to further interpret the regression.

It is interesting to notice the parameter estimated from the regression ($\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$). Despite the fact that p-values of prior dispersion ($LDisp_i$) and change in dispersion ($ADISP_i$) are insignificant, the pattern of predicted beta value of them is consistent with the pattern of Bamber, Barron and Stober (1997). In Bamber, Barron and Stober (1997), change in dispersion ($ADISP_i$) has the highest value of beta parameter (0.447), following by opinion jumbling ($LJumb_i$) and prior dispersion ($LDisp_i$) (0.026 and 0.013 respectively). We can interpret that analysts’ target price may substitute analysts’ earning forecast to proxy the market opinion.

However, adjusted R-square from this study (6.3%) is relatively lower than the peer studies. Bamber, Barron and Stober (1997) reported adjusted R-square of 14.08% - if it not due to smaller sample size of this study (68) comparing to the sample size of 1,972 in Bamber, Barron and Stober (1997), the low adjusted R-square could be interpreted that target price may be a weaker proxy of market opinion comparing to analysts’ earning forecast.

\(^{12}\) See Appendix C.

\(^{13}\) This is inconsistent with the prediction of previous studies, for example, Kim and Verrecchia (1991) predicted the positive relationship between prior dispersion and trading volume. Barron and Karpoff (2004) predicted the positive relationship between change in dispersion and trading volume. The regression in this study also predicts the positive relationships (correct sign) but at very low significant level.

\(^{14}\) This is consistent with the prediction of Karpoff (1986).
Au, Asquith and Mikhail (2005) documented adjusted R-square of 24%. Au, Asquith and Mikhail (2005) studied the impact of target price on abnormal return, with slightly different definition of variables, they found that target price information has impact over abnormal return, hence it contains information. The lower R-square of this study does not mean that target price in this study contains less information than Au, Asquith and Mikhail (2005)’s study. Because it may not appropriate to directly compare the study focusing on price to the study focusing on volume.

Theoretical work of Kim and Verrecchia (1991) predicted that the absolute change in stock price is a positive function of precision of the announcement. Their prediction supports empirical findings of Au, Asquith and Mikhail (2005). However, Kim and Verrecchia (1991) explained that trading volume may not be well interpreted by the precision of the announcement information – this is due to the market noise.

Therefore, if target price is exactly the opinion of SET’s participants, and if Kim and Verrecchia (1991)’s prediction is true, the low R-square can be interpreted as SET is a noisier market during 2nd May to 31st October 2007. Macro-economic factors during this period (Thai Baht appreciation or political instability before the election) could be the source of noise in the SET.

5.4 Validation of Underpinning Assumptions

The regression analysis is based on a number of assumptions. There are 3 assumptions investigated in this section

1. Multicollinearity does not exist
2. Variance of residuals is constant
3. The residuals are normally distributed
**Test for Multicollinearity**

Table 5.11: Collinearity statistics of the regression result: no multicollinearity

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig. Std. Error</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant) 1</td>
<td>.116</td>
<td>.083</td>
<td></td>
<td>1.396</td>
<td>.167</td>
<td></td>
</tr>
<tr>
<td>LDISP 1</td>
<td>.013</td>
<td>.032</td>
<td>.058</td>
<td>.403</td>
<td>.689</td>
<td>.668</td>
</tr>
<tr>
<td>dDISP 1</td>
<td>.447</td>
<td>.309</td>
<td>.207</td>
<td>1.449</td>
<td>.152</td>
<td>.684</td>
</tr>
<tr>
<td>LJUMB 1</td>
<td>.026</td>
<td>.012</td>
<td>.266</td>
<td>2.218</td>
<td>.030</td>
<td>.972</td>
</tr>
</tbody>
</table>

a Dependent Variable: ALV

Table 5.11 is statistics obtained from SPSS according to the model specification in section 5.3. It shows that tolerance and variance inflation factors (VIF) of all independent variables fall in a satisfactory range (VIF below 5). It identifies that the model is free from multicollinearity problem.

**Test for Constant Variance**

This study uses scattergram to plot the relationship between the residuals and the predicted value of dependent variable and each independent variable.
Figure 5.8: Scattergrams of residuals plotted against predicted value of dependent variable and independent variables: variance of residuals is constant

According to previous 4 scattergrams, there is no distinct pattern of fanning in or fanning out. The residuals seem random. It could be diagnosed that the variance of residuals is constant.

Test for normality of residuals

This study uses histogram of residuals and the normal P-P plot of SPSS to diagnose normality of residuals.
The probability-probability (P-P) plot (from Minitab) shows that the residual is slightly non-normal. By the Ryan-Joiner normality test, the standardized residual is accepted to be normal at the p-value of 0.014.
The histogram of standardized residuals (from Minitab) shows that it is near to normal distribution with kurtosis of 2.2214 and skewness of -0.3488. The residual may be accepted as normal.

**Conclusion of validation**

From the validation of 3 underpinning assumptions of the regression model specification of section 5.3, it could be concluded that the data is proper for regression analysis.
Chapter 6

Summary of findings, Conclusion and Recommendations

This chapter begins with a brief result of chapter 5, the summary of findings. The result is elaborated in the conclusions section and criticized in the recommendations section. The chapter ends with the suggestions for future studies.

6.1 Summary of Findings

The regression in chapter 5 yields a low significance level of F-test at 0.068, slightly exceeds the acceptance level of 0.05.

It has the adjusted R-square of 6.3% - about half of peer studies.

It gives the correct positive sign of all beta value consistent to the theories and evidences of empirical studies. The beta value of change in dispersion ($\Delta\text{DISP}_i$) is highest (0.447), following by the beta value of opinion jumbling ($LJUMB_i$ - 0.026) and prior dispersion ($LDISP_i$ - 0.013). This is consistent to the previous empirical study.

However, t-statistics of $\Delta\text{DISP}_i$ and $LDISP_i$ is lower than 2 (1.449 and 0.403). Only $LJUMB_i$ has t-stat higher than 2 (2.218).

By stepwise method\textsuperscript{15} in SPSS, SPSS excludes $\Delta\text{DISP}_i$ and $LDISP_i$ from the model specification, only $LJUMB_i$ remains with higher t-statistics and similar beta value.

6.2 Conclusions

The findings of this study confirm the evidence in Bamber, Barron and Stober (1997). It has the same pattern of higher beta value for change in dispersion ($\Delta\text{DISP}_i$) and lower beta value for prior dispersion ($LDISP_i$) and opinion jumbling ($LJUMB_i$), despite the fact that change in dispersion ($\Delta\text{DISP}_i$) has weaker theoretical background.

\textsuperscript{15} See Appendix C for the results.
Since Beaver (1968), prior dispersion of opinion ($LDISP_i$) was empirically tested by a substantial number of studies and they found a positive relation of prior dispersion with trading volume. The prior dispersion hypothesis is laid on strong theoretical backgrounds, Grossman and Stiglitz (1976), Varian (1985), Grundy and McNichols (1989).

Opinion jumbling ($LJUMB_i$), rate of jumbling of market revision reacting to the arrival of new information, is also based on strong theoretical background of Karpoff (1986). Karpoff (1986) predicted that the market jumble up their opinion on stock price, eventually, they trade as the result of jumbled opinion.

Change in dispersion ($\Delta DISP_i$), the change in dispersion reacting to the arrival of information, has weaker theoretical background. Barron and Karpoff (2004) predicted that, in a market with high trading cost, the precision of announcement could be negatively related to trading volume. The precision of announcement was coined by Kim and Verrecchia (1991). Barron and Karpoff (2004) assumed that traders are diversely informed and differ in the precision of their private information. If the information of an announcement is precise, the information which is assumed to be randomly known to each market participant will be known to each market participant with low variance – each market participant receives slightly different information (released from the announcement) relative to all market participants. In other word, at the earning announcement, if the company’s performance turns out as the majority of the market expected, the announcement is precise.

However, it seems that $\Delta DISP_i$ of this study is much larger than Bamber, Barron and Stober (1997) – this may confirm the prediction of Barron and Karpoff (2004) that in a market with high trading cost, like SET – a market with short-sales constraint, the negative precision of announcement produces more trade than the market with lower trading cost in Bamber, Barron and Stober (1997).

The preceding conclusion is interpretation of each variable; the following is the interpretation of the model as a whole.

The low t-statistics, significance F and adjusted R-square obtained from the regression could be interpreted many ways. The most serious interpretation is the
abnormal trading volume is unrelated to dispersion of opinion. This refutes the main hypothesis of this study.

However, by relaxing criterion of F-test significance, the low adjusted R-square can be interpreted in many ways.

The first interpretation is that it may due to small sample size. This study is a cross-sectional study on 1 quarter with sample size of 68. Bamber, Barron and Stober (1997) was a panel study on 40 quarters with sample size of 1,972. The smaller sample size may cause the sampling error and weaken the power of statistical test.

If the sample size is not the problem, the low adjusted R-square may indicate that analysts’ target price may be a weaker proxy of market opinion comparing to the analysts’ earning announcement used in Barron, Bamber and Stober (1997).

If the target price is a proper proxy of market opinion, the low adjusted R-square may be due to misspecification of the model. The abnormal volume used in this study may be excessive and distort the result.

If the model specification is right, the low adjusted R-square may be due to market noise. Kim and Verrecchia (1991) indicated that when trading volume cannot be well interpreted by arrival of information, it can be due to market noise. This could lead to the conclusion that SET was a noisy market at least during 2nd May to 31st October 2007. The possible source of market noise during this time could be from macro-economic factors: political instability and appreciation of Thai Baht.

Finally, after running regression by stepwise method in SPSS, prior dispersion (LDISP) and change in dispersion (∆DISP) are excluded from the regression. Only jumbling of opinion (LJUMB) has significant positive relationship with trading volume.

6.3 Recommendations

The recommendations to alleviate the problem of low significance level of this study could be many.

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16 In rational expectation model, trade is originated from 3 sources; informed traders, uninformed traders and noise trading. Noise trading is unexpected demand for trade due to trader’s idiosyncrasy. It is often interpreted as liquidity trade by empiricists.

17 See appendix C.
It may be from data insufficiency which could be simply improved by a larger sample size – especially to obtain higher number of paired forecast for calculating dispersions of opinion.

It would be due to ambiguous definition of target price forecast used. The previous studies, Au, Asquith and Mikhail (2005) and Bamber, Barron and Stober (1997) did not clearly specify the forecast used.

Or it could be owing to over-normalization of trading volume. The trading volume used in this study is normalized for 3 times. Turnover ratio is the first normalization to make it suitable for cross-security comparison. Log-transformation is the second normalization to make the distribution of trading volume normally distributed. Abnormalization is the last normalization to make trading volume free from domination of large company trading volume in the analysis. Bamber, Barron and Stober (1997) did not use abnormal volume. The abnormalization may be the excessive normalization.

Lastly, the abnormal volume in this study is abnormalized by normal volume of past mean. The resulted abnormal volume is not free from concurrent portfolio rebalancing activities and autocorrelation pattern of trading volume. To use market model to calculate abnormal trading volume could eliminate these effects and may improve significance of this study.

### 6.4 Suggestions for Future Studies

Consistent to Bamber, Barron and Stober (1997), and the fact that there is no theory to explain exactly influence of the change in dispersion of opinion on trading volume, there should be a theoretical study on this relationship.

Moreover, traditional studies use earning forecast as the proxy for market opinion. Only recently, there are a few number of studies suggesting the usefulness for target price as the proxy, Bradshaw (2002), Au, Asquith and Mikhail (2005), Brav and Lehavy (2003). There could be a direct comparison study of the usefulness of target price versus earning forecast on trading volume.

Finally, the model specification is perhaps extendable. There could be a number of additional variables into the model. It could be mean forecast revision as used in Ajinkya, Atiase and Gift (1991), or proxy for precision of announcement, Kim and
Verrecchia (1991), or the change in price as a control variable, Bamber, Barron and Stofer (1997).
References


Li, Oliver Zhen, Xie, Hong and Xu, Weihong, (2005). Heterogeneous valuation of accruals and trading volume. Working Paper Available at SSRN


Appendix A

There are 4 steps of EGLS; (i) run OLS on original equation, (ii) regress residuals on lagged residuals to estimate rho, (iii) transform variables using this estimate rho, and (iv) run OLS on the transformed variables.

First, begin with running this OLS, (step i)

\[ Y_t = a + bX_t + e_t \]  

Second, regress \( e_t \) on \( e_{t-1} \) to estimate rho, the impact of lag 1 errors on contemporaneous errors. (step ii)

\[ e_t = \rho e_{t-1} + u_t \]  

Third, the secret is to create a new estimating equation by transforming the original variables in the process of eliminating the first order serial correlation. (step iii)

Multiply equation-19 by \( \rho \), estimated from equation-20

\[ \rho Y_t = \rho a + \rho bX_t + \rho e_t \]  

Lag equation-21 for 1 time period

\[ \rho Y_{t-1} = \rho a + \rho bX_{t-1} + \rho e_{t-1} \]  

Subtract equation-22 from equation-19

\[ Y_t - \rho Y_{t-1} = (a - \rho a) + (bX_t - \rho bX_{t-1}) + (e_t - \rho e_{t-1}) \]  

\[ Y_t - \rho Y_{t-1} = a(1 - \rho) + b(X_t - \rho X_{t-1}) + (e_t - \rho e_{t-1}) \]  

From equation-20, \( e_t = \rho e_{t-1} + u_t \), then

\[ Y_t - \rho Y_{t-1} = a(1 - \rho) + b(X_t - \rho X_{t-1}) + u_t \]  

The serially correlated term, \( e_t \), now is eliminated. Then simplify equation-25 by redefining each transformed variable to the right side of the equation
\[
Y^* = Y_t - \rho Y_{t-1} \\
X^* = X_t - \rho X_{t-1} \\
k^* = 1 - \rho
\]

Then \( Y^* = ak^* + bX^* + u_t \) \( \text{equation-26} \)

Using equation-26 to regress \( Y^* \) on \( k^* \) and \( X^* \). This is the EGLS method to derive abnormal volume proposed by Ajinkya and Jain (1989)
Appendix B

Ajinkya and Prem (1989), Cready and Ramanan (1991), and Campbell and Wasley (1996) are the study of statistical properties of abnormal volume.

The rational of the study is that they calculate abnormal volume by various deriving methods. After adding artificial trading volume to the calculated abnormal volume, they compare that how detectability of abnormal volume between each deriving method. They measure the reliability of abnormal volume detection of each deriving method at different sample size.

The differences between these methods are that Ajinkya and Prem (1989) uses direct addition method to calculate artificial abnormal trading volume. Cready and Ramanan (1991) argue that addition method to the log transformed volume violates many statistical assumptions; instead, they propose the multiplicative method. However, despite of improved method, they have the same conclusion like Ajinkya and Prem (1989). Campbell and Wasley (1996) use non-parametric instead of parametric test to test detectability of abnormal volume and find the same result.
Appendix C

In addition to the regression model specification in the analysis, there are also other 2 specifications tested. These 2 specifications are the result from the linear regression of the model specified in the analysis, however, despite of by the enter method; it is done by the stepwise method which automatically excludes the irrelevant variables from the regression. The 1\textsuperscript{st} specification in this method is the case of with outliers, and the 2\textsuperscript{nd}, without outliers. And these are the brief results.

Specification: \( ALV_i = \alpha_i + \beta LJUMB_i + \epsilon_i \) \hspace{2cm} equation-27

(Prior dispersion \((LDISP_i)\) and change in dispersion \((\Delta DISP_i)\) are excluded according to the stepwise method)

<table>
<thead>
<tr>
<th>Model</th>
<th>N =</th>
<th>intercepts</th>
<th>beta</th>
<th>F-stat</th>
<th>Adj-R(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With outliers</td>
<td>71</td>
<td>.007 (.002)</td>
<td>.005 (.003)</td>
<td>9.291 (.003)</td>
<td>.106</td>
</tr>
<tr>
<td>Without outliers</td>
<td>68</td>
<td>.078 (.000)</td>
<td>.026 (.027)</td>
<td>5.123 (.027)</td>
<td>.058</td>
</tr>
</tbody>
</table>

* Significance level in parenthesis

These results indicate that jumbling of opinion \((LJUMB_i)\) has significant positive relationship with trading volume.