Are short sellers equally informed? Evidence from the US. credit rating announcements.

Miss Omtong Kasemsant

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ผู้ขายชอร์ตมีข้อมูลเท่าเทียมกันหรือไม่ หลักฐานจากการประกาศอันดับความน่าเชื่อถือของประเทศสหรัฐอเมริกา

น.ส.ออมทอง เกษมสันต์

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By	Miss Omtong Kasemsant
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Thesis Advisor	Assistant Professor TANAKORN LIKITAPIWAT, Ph.D.

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INDEPENDENT STUDY COMMITTEE

..... Chairman
(Assistant Professor RUTTACHAI SEELAJAROEN, Ph.D.)

..... Advisor
(Assistant Professor TANAKORN LIKITAPIWAT, Ph.D.)

..... Examiner
(Assistant Professor RUTTACHAI SEELAJAROEN, Ph.D.)

..... Examiner
(Associate Professor KANIS SAENGCHOTE, Ph.D.)

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This study uses credit rating and daily short sale data of firms listed in NYSE from January 2015 to December 2021 to examine whether there is informed trading. Although post-announcement abnormal return is negatively correlated with abnormal short volume, no evidence of informed short selling is found. Higher level of pre-announcement abnormal short selling is positively correlated to default risk and also explained by the incentives of short sellers to short more when past returns are negative. Furthermore, increase in short selling that is preceded by credit watch placement is more pronounced before credit rating downgrades. Moreover, the evidence shows that cumulative abnormal return pre-announcement is positively and significantly correlated with the abnormal short sale activities pre-announcement. Lastly, this study provides evidence that institutional investors or medium or large trade size increase short position more heavily than smaller trade sizes.

Field of Study:	Finance	Student's Signature .....
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1. Introduction

An asymmetric information environment between informed and uninformed parties has created an opportunity for insiders to trade on stocks when market value diverges from the security's true value Karpoff and Lee (1991); (Ke et al., 2003). Although there is now overwhelming documentation informed traders who trade opportunistically from private information are concentrate amongst short sellers, they suggest only that they have informational advantage over other traders. In this study I ask whether they are equally informed. However, there are debates on whether short sellers gain the abnormal return from their greater skill to interpret public information or they have access to private information. According to prior theoretical literature, managers and other insiders with private information may trade opportunistically to maximize profit before any such information delivers to the capital markets (Elliott et al., 1984). In comparison, Engelberg et al. (2012) and Blau and Wade (2012) document that skilled information processors like short sellers and gain valuable trading opportunities from public news and that short sellers are not incrementally informed prior to public announcement.

There are limitations for existing empirical studies due to the difficulty of obtaining acceptable proxies for levels of information asymmetry. Handful of studies use major corporative events as a representative. For instance, as documented by Christophe et al. (2010) document, short sellers make better stock return prior analysts downgrades. Wei and Zhou (2016) and Blau and Wade (2012) examine the issue using earning announcements. Kedia and Zhou (2014) document the evidence of informed trading around merger and acquisitions events. Majority of event studies are scheduled announcements while less focuses on unscheduled announcements. According to

Moody's[1], after making a decision on rating action to be announced, they will inform the issuer and its agents privately about the adjustments. The inequalities in trading volume and patterns in this study prepares a realistic analysis of information asymmetry through unforeseen announcements, which have no settled timing and direction. This becomes a motivation to focus on issuers rating change announcements as unscheduled events.[1]

Credit watch placement is used when it is believed that there is a high possibility of changes in rating action within the next 90 days. From time to time, events may demonstrate such significant uncertainty to creditworthiness that a rating is placed on credit watch without any need to assess this threshold of possible change. It acts as a warning to market participants. Some credit rating announcements are made with shock by not preceded by credit watch placements. As a result, a reaction of short sellers toward these downgrades will be explored.

For all the aforementioned reasons, short sellers can be urged to perform short sales knowing that stock prices will fall significantly. In this research, existing credit rating literatures are extended by connecting the issuer credit watch placement event of NYSE

[1] Excerpt from Moody's Practices Guidance for the Credit Rating Process under the Treatment of Confidential Information section: "When speaking with investors, subscribers, the press, or other third parties, MIS Employees may not give any guidance of possible future rating actions on any issue or Issuer, unless that information has been publicly announced in an MIS Credit Rating Announcement. This restriction applies equally to prospects for rating actions as well as the absence of rating actions. In addition, MIS Employees may not give, either implicitly or explicitly, orally or in writing, any assurance in advance concerning, or any prior guarantee of, any rating action." And under the Informing the Issuer of the Credit Rating section: "As soon as practicable after a rating committee reaches a decision regarding a Credit Rating action and where feasible, Analysts may communicate the Credit Rating decision only to the Issuer and / or its designated agents, and not to any other external party. Timing may vary, depending on the specific circumstances. The timing of the rating release should also be considered in light of the orderly functioning of the capital markets and broad access to the disseminated information. As stated in MIS Code 3.9, where feasible and appropriate, the Lead Analyst will typically contact the Issuer or its designated agent to inform them of the critical information and principal considerations upon which the Credit Rating is based." See : https://www.moodys.com/sites/products/ProductAttachments/Compliance/Exhibit%203/Best%20Practices%20Guidance%20for%20the%20Credit%20Rating%20Process.pdf

listed companies to its actual credit rating change by performing event study. Another contribution is to additionally examine if a specific group of short sellers has received superior gains by the distinct trading patterns between each group of investors (individuals vs individual). Kaniel et al. (2007), for example, use account type of transactions listed on NYSE to look at investor sentiment. Boehmer and Kelley (2009) explore informational advantage among institutional traders by the relationship between stock prices and volume. Taking into account the heterogeneous nature of investors by using trade-size as a proxy has not been covered in this area of study. Christophe et al. (2010); Daske et al. (2005); Diether et al. (2005) are among the authors who have studied shorting flow data, but their studies do not distinguish between different traders.

1. Literature Review & Hypothesis development

2.1 Credit rating and Credit watch placements

Credit rating agencies (CRAs) like Moody's Investors Service and Fitch Ratings have a significant role in the access to capital markets for bond issuers (Williams et al., 2013). They made assessment based on confidential non-public information provided by issuers. These assessments are published through credit rating announcement which mainly about credit rating changes, including upgrades and downgrades, credit watch placement, and credit outlook.

CRAs announcements are made by CRAs who have access to firms' confidential information. An update on credit rating of firms send out a signal in regard to a change in the firm's financial health, and provide investors with credible signals about borrowers' creditworthiness and debt obligation. He et al. (2011) and Alanis et al. (2020) demonstrate that rating announcements alleviate information asymmetry as it

brings useful information to the market which investors can benefit from.

Table 1. Description of ratings symbols assigned by Fitch and Moody's Investors Service.

Moody's	Fitch	Description
Investment grade		
Aaa	AAA	Highest quality
Aa1, Aa2, Aa3	AA+, AA, AA-	High quality
A1/A2/A3	A+, A, A-	Upper medium grade quality
Baa1/Baa2/Baa3	BBB+, BBB, BBB-	Medium grade quality
Speculative grade		
Ba1/Ba2/Ba3	BB+, BB, BB-	Speculative, substantial credit risk
B1/B2/B3	B+, B, B-	Speculative, high credit risk
Caa	CCC+, CCC, CCC-	Speculative and current vulnerability to default
Ca/C/D	CC, C, D	In bankruptcy or default

Source: Fitch, and Moody's Investors Service materials.

The Wall Street Journal (WSJ) (2004) reports that some companies decide to issue new shares in order to avoid rating downgrades. Other reports like WSJ (2002) and Barrons (2003) document that some companies decide to offload some of the their debts so that they may receive an upgrade in ratings or avoid a possible rating downgrade. The impact of company credit ratings changes on financing costs and value of the company have been a big concern for rated companies (Kisgen, 2006).

Goh and Ederington (1993); Griffin and Sanvicente (1982); Holthausen and Leftwich (1986) prove that changes in credit ratings impact equity returns. Therefore, it is reasonable for informed short sellers for making attempt to anticipate potential downgrades before this information are made public.

Stock market reactions towards negative announcement are stronger than that of the positive one. According to She et al. (2017), credit rating downgrades come out with new information and consequently create momentous stock price reactions. In fact, both rating upgrades and downgrades reveal good or bad news regarding firm's financial

health, and therefore leads to a changes in information asymmetry for good news and bad news respectively.

Although there plentiful of studies that explore the price reactions around credit rating changes, there are two main research in this area of studies that highlight the issue of informed short sellers. Henry et al. (2015) does not observe significant level of abnormal short selling, which interpreted as short sellers are successful at forecasting profitable downgrades. They can use short interest to find firms that present default likelihood and credit rating downgrades before announcements were made public. The literature is done on China market as a representative of emerging market.

Another research worth mentioning is by Shi et al. (2017) which explores the behavior using short selling volume and find that short selling magnitude increase two days before the announcement. The literature is done on the US market and conclude that short sellers are informed trader.

Credit watch placements, according to Chiyachantana et al. (2014), bring new information to the market by incorporating abnormal return information. However, the results cannot be generalized because they are based on small samples.

2.2 Informed trading between institutional and individual investors

Each group of investors perform differently. In particular, domestic investors perform better than foreign peers due to ease of access to local businesses information. (Bae et al., 2008; Chan et al., 2007; Choe et al., 2005; Dvořák, 2005; Hau, 2001; Lee & Jung, 2016) International investors possess more informational than domestic traders because of their prior experience and advanced trading technique. (Bae et al., 2006;

Chung et al., 2017; Froot & Ramadorai, 2008; Grinblatt & Keloharju, 2000; Huang & Shiu, 2009; Kamesaka et al., 2003; Richards, 2005; Yang et al., 2017).

In equity market, the majority of studies show that institutional investors have superior information over individual investors. (Barber et al., 2009; Chuang & Susmel, 2011; Ng & Wu, 2007; Nofsinger & Sias, 1999; Scott et al., 2009) Moreover, Irvine et al. (2007) find abnormal return among institutional investors in the US prior to analysts' buy recommendation. Even-Tov and Ozel (2021) discover that institutional investors benefit from private information disclosed by credit analysts to accelerate their careers.

In contrast, Blau and Wade (2012)and Blau and Pinegar (2013) suggest that short sellers are not incrementally informed but sophisticated.

2.3 Hypothesis Development

To observe short sellers' reaction towards negative announcement, short-selling volume is used as a proxy to investigate their trading activities around those event days. H1 is formed to test whether issuer downgrades are associated with abnormal return. A significant abnormal short-selling toward the announcement date should be observed.

H1. Short sellers increase their short position towards the credit rating downgrade announcements.

In addition to that, credit watch placement offers investors more time for to absorb information and acts as warnings. As a result, larger response on credit rating changes not preceded by credit watch placement in comparison to changes with credit watch placement should be observed. H2 is developed to test whether credit watch placement is an event that provides beneficial information to the market.

H2. Short sellers increase their short position significantly higher when the credit rating downgrades announcements are not preceded by negative watch placement (Surprise downgrades).

Additionally, Shi et al. (2017) suggest that superior return can either come from short-sellers' ability to process information or a possession of nonpublic information. Moreover, Diamond and Verrecchia (1987) document that short sellers can generate benefit from information before it become public. Taking that into consideration, the returns following the downgrades should be negatively correlated with levels of abnormal short selling prior the public downgrades if short sellers can anticipate the downgrades beforehand. This relationship should be observed in H3.

H3. Increase in short position toward the credit rating downgrade announcements is negatively correlated to post-announcement abnormal stock returns.

Finally, trade-size is used as a proxy to distinguish between trades initiated by individual and institutional investors. These two types of investors differ in terms of sophistication in response to information, according to a substantial amount of previous research (Hand, 1990; Lee & Radhakrishna, 2000; Walther, 1997). If the result is consistent with numerous studies that suggest that institutional short sellers possess more information and are better informed, larger short selling volume by this type of short sellers should be observed.

H4. Increase in abnormal short sale volume among institutional short sellers toward the dates of negative CRA announcement are greater than that of individual investors.

2. Data & Methodology

2.1 Data

Ratings data used in this analysis are long-term issuer ratings and Credit Watch Placement made public by Moody's and Fitch. Each data set are collected from Refinitiv Eikon containing dates of the announcements, rating source, action type, direction, and Equity RIC.

Short sale volume data for stock listed in NYSE during January 1, 2015 to December 31, 2021 are retrieved from FINRA. These data are publicly available for off-exchange trades in exchange-listed securities reported to FINRA Trade Reporting Facility (TRF) or the Alternative Display Facility (ADF), as well as for trades in securities traded over-the-counter and reported to FINRA's Over the Counter Reporting Facility (ORF). Daily short sale volume contains aggregated short volume for each firm. Monthly short sale transaction listed trading activity of all short sale trades executed during normal market hours as well as after-hours.

Lee and Radhakrishna (2000) find that trade size is a highly effective way to separate between individual and institutional investors' trading activities. Barclay and Warner (1993) and Chakravarty (2001) document that among short sellers, short sellers that are informed use larger orders. Approximately, uninformed group are concentrated among small short sale order. Medium-sized orders of 500 to 5,000 shares, on the other hand, are more informed. Orders of at least 5,000 order size, which is largest, is the most informative about price prospects. For this reason, the type of short sellers are categorized by number of shorted shares exhibited in Table 2.

Table 2. Trade size categories.

Size	Number of shorted shares	Investor type
Small	100-400	Individual

Medium	500-9,900	Institutional
Large	10,000 or more	Institutional

FINRA transactions files are merged with rating announcements by Equity RIC. Center for Research in Security Prices (CRSP) is applied to obtain daily stock returns to match with CRAs announcements with its tickers, 6-digits CUSIPs, and equity RIC. NYSE daily stock price are retrieved from Refinitiv Eikon Workspace to calculate abnormal return.

2.2 Data Summary

To remove potential errors and maintain integrity of the dataset, three following filters are applied. First, if there are multiple announcements within 10 days, only the first one is maintained (Meng et al., 2017; Shi et al., 2017). Next, credit watch placement and issuer rating changes associated with other news information within five-day event window are removed. Lastly, announcements made by Moody's are selected for rating events announced by both agencies. After matching rating announcements with NYSE shorted firms, there are 207 firms left.

Table 3 displays a summary of credit rating and credit watch placement announcements. There are 63 events of (A.) negative watch placement announcements. For downgrades events (B.), there are 314 events and 11.15% of them are preceded by negative credit watch placements while the remaining are ratings with no advanced notice.

Table 3. Summary Statistics of Rating announcements.

Panel A. Negative Watch Placements

	Negative Watch Placement	
Year	No.	%
2015	30	28.30%

2016	21	19.81%
2017	12	11.32%
2018	13	12.26%
2019	8	7.55%
2020	9	8.49%
2021	13	12.26%
Total	106	100.00%

Panel B. Rating Downgrades

			With Credit Watch Placement		Without Credit Watch Placement	
Year	No.	%	No.	%	No.	%
2015	46	11.41%	4	8.16%	42	11.86%
2016	65	16.13%	23	46.94%	42	11.86%
2017	37	9.18%	0	0.00%	37	10.45%
2018	65	16.13%	7	14.29%	58	16.38%
2019	57	14.14%	6	12.24%	51	14.41%
2020	103	25.56%	2	4.08%	101	28.53%
2021	30	7.44%	7	14.29%	23	6.50%
Total	403	100.00%	49	100.00%	354	100.00%

Panel C. Positive Watch Placements and Rating Upgrades

	Positive Watch Placement		Upgrades	
Year	No.	%	No.	%
2015	10	23.81%	37	12.67%
2016	3	7.14%	37	12.67%
2017	4	9.52%	36	12.33%
2018	2	4.76%	28	9.59%
2019	2	4.76%	51	17.47%
2020	8	19.05%	22	7.53%

2021	13	30.95%	81	27.74%
Total	42	100.00%	292	100.00%

2.3 Normal/Abnormal Short Selling and Abnormal Return Estimation

This study compares three approaches of expected trading volume estimation. The estimation is similar to those of Christophe et al. (2004); Christophe et al. (2010); Feng and Chan (2016); Henry et al. (2015). Normal shorted sale volume is calculated by percentage of outstanding shares traded on a given day for all three models:

$$V_{it} = \frac{(n \times 100)}{s_{it}}$$

where n_{it} is the number of shares shorted for firm i on day t and S_{it} is the firm's outstanding shares on day t.

2.3.1 Model 1 : Abnormal short sale volume (ABSS) is measured by Normal shorted volume minus the median of daily normal short sale volume during the entire period.

ABSS = V_{it} – Median of daily short selling during the entire period

2.3.2 Model 2 : Market model abnormal short volume (Campbell & Wasley, 1996) :

$$ABSS_{it} = V_{it} - (\propto_i + \beta_{it} V_{mt}),$$

where $\propto_I$ and β_i are obtained by ordinary least squares (OLS) estimation. The market short volume is measured by:

$$V_{mt} = \frac{1}{N} \sum_{t=1}^{N} V_{it}$$

2.3.3 Model 3 : Mean-adjusted abnormal shorting volume (Campbell & Wasley, 1996):

$$ABSS_{it} = V_{it} - \bar{V}_{it}$$

Where

$$\bar{V}_{it} = \frac{1}{T} \sum_{t=f}^{t=l} V_{it}$$

T is the number of days in the estimation period, f(l) is the first(last) day of estimation period. One-half of the estimation period is drawn from the period prior the event date and another half is from the period after the evet date. The estimation period for this study will be discussed in later section.

The abnormal returns are computed to determine whether there are significant difference between returns before changes in ratings. The difference between the event firm's daily return and S&P 500 equally weighted index on the same date is used to estimate abnormal return (Shi et al., 2017).

$$AR_{i,t} = R_{i,t} - R_{m,t}$$

$$CAR_{i,t} = \sum_{i=1}^{t} AR_{i,t}$$

2.4 Methodology

The basic event study methodology is employed to test for H1, H2, and H4. The event windows are [-15,-6], [-5,-3], [-2,-1], [0,1], and [2,10].

For Model (2) and (3), I use 100 days estimation period. Since first day of event period is -15, the first part of estimation period is day -65 to day -16.. The test statistics in this study follow the analysis of Ajinkya and Jain (1989) and Cready and Ramanan (1991):

$$t_{ABSS=}\frac{\bar{v}_t}{s(\bar{v})}$$

$$t_{CABSS=}\frac{CABSS(T_1,T_2)}{s(\bar{v}_t)\sqrt{T_2-T_1}}$$

Where $\bar{v}$ is the equal-weighted portfolio mean abnormal trading volume on the event date,

$$\bar{v} = \frac{1}{N}\sum_{i=1}^{N} v_{it}$$

$$s(\bar{v}) = \sqrt{\frac{1}{T}\sum_{t=f}^{t=l}(\bar{v} - \bar{\bar{v}})^2}$$

$\bar{\bar{v}}$ is the mean of the $\bar{v}_t$ over the estimation period ($\bar{\bar{v}}$ = $1/T\sum_{t=f}^{t=l}\bar{v}$). N is number of events. The standard deviation is estimated from time-series data from the estimation period, and T-1 are degrees of freedom. CABSS is cumulative average short sale volume of each window period. T_1 denotes the starting day of the window period and T_2 is the day where window period ends.

2.5 Multivariate test

The regression is conducted with the purpose to accomplish H3. If short sellers can anticipate announcements contents, the correlation between abnormal short sale volume and cumulative abnormal return post announcement should be negative and statistically significant. Similar to Shi et al. (2017), the relationship between abnormal

short selling 2 days before the announcement, ABSS(-2,1) and cumulative abnormal returns on and one day after the announcement, CAR(1,0) are included as the main focus of this section. Ordinary Least Squares (OLS) is employed for both set of announcements to investigate the correlation between these two variable.

$$ABSS(-2,-1) = \beta_0 + \beta_1 Log(P0) + \beta_2 CAR(-2,-1) + \beta_3 MOM + \beta_4 CAR(1,0) + \beta_5 RATING + \varepsilon, \quad (1)$$

where *ABSS(-2,-1)* is abnormal short selling during the two days before the downgrade announcement.

P_0 is the firm's stock price on the day of announcement (day 0), used as a proxy for liquidity.

CAR(-2,-1) is the cumulative abnormal return two days before announcement period, to control for the possibility that increases or decreases in short-term price affect the level of short-selling.

MOM is the momentum effect of stock, controlling the effect of long-term share price movement on the willingness to short stock . MOM is described as the event firm's six-month cumulative return during the period ending 10 days before the negative announcement date minus the return on S&P 500 index during the same period.

CAR(0,1) is cumulative abnormal return on and one day after the event day.

RATING is added to control for the possibility that short-sellers' are willing to short stocks with bad credit ratings. The value of issuer credit rating transformed into ordinal scale as exhibited in table 4, where the lower default risk of the firm taking a higher

numerical value. This study follows Ferri et al. (2000) for conversion of alphanumeric rating into numeric values.

Table 4. Moody's and Fitch rating systems and systems and linear transformations to ordinal scale.

Moody's	Fitch	Numerical Value
Aaa	AAA	1
Aa1	AA+	2
Aa2	AA	3
Aa3	AA-	4
A1	A+	5
A2	A	6
A3	A-	7
Baa1	BBB+	8
Baa2	BBB	9
Baa3	BBB-	10
Ba1	BB+	11
Ba2	BB	12
Ba3	BB-	13
B1	B+	14
B2	B	15
B3	B-	16
Caa	CCC+, CCC, CCC-	17
Ca	CC	18
C	C	19
D	D	20

The regression is conducted with the purpose to accomplish H3. If short sellers are sophisticated information processors who can forecast announcements contents, negative and statistically significant coefficient of abnormal short selling (ABSS(-2,-1)) and cumulative abnormal return post announcement (CAR(0,1)) should be observed.

3. Empirical findings

This part highlights four main points which parallel the four hypotheses.

3.1 Short sellers' reaction toward negative announcements.

Table 5. Average abnormal short sale volume

	ABSS			CAR%
	(1)	(2)	(3)	
Panel A. Downgrades				
-15 to -6	52.5691 ***	48.0900 ***	41.1405 ***	-0.8160% **
-5 to -3	62.4110 ***	57.9334 ***	50.9707 ***	-0.5206% **
-2 to -1	73.4676 ***	68.9900 **	62.0272 *	0.1064%
0 to +1	84.0197 ***	79.4822 ***	72.6815 ***	-12.3824% ***
+2 to +10	70.6027 ***	66.5122 ***	59.1301 ***	-0.1070%
Panel B. Downgrades with Negative Watch Placement				
-15 to -6	11.0658 **	57.4217 ***	61.1880 ***	-5.9593%
-5 to -3	9.7781 *	56.1340 ***	14.4933	-0.2321%
-2 to -1	8.6425 **	54.9984 *	7.3911	-0.5478%
0 to +1	28.1384 *	74.4943 **	46.3829	-0.1568%
+2 to +10	17.7967 **	64.1525 ***	115.6472 ***	-2.1091%
Panel C. Downgrades without Negative Credit Watch Placement				
-15 to -6	57.0270 ***	47.0878 ***	44.3539 ***	-0.2636%
-5 to -3	68.0402 ***	58.1259 **	55.3593 ***	-0.5515% *
-2 to -1	80.4007 ***	70.4864 *	67.7198 ***	0.1763%
0 to +1	90.0123 ***	80.0203 *	77.4444 ***	-13.6900%
+2 to +10	76.2672 ***	66.7625 ***	63.5437 ***	0.1077%

This table reports the average abnormal short sale volume (ABSS) by model 1, 2, and 3, and cumulative abnormal return (CAR%) 15 days prior to 10 days after credit rating downgrades. Model 1 is computed by the event's firm average daily shorted shares during the event window period minus median of daily short selling of the entire period. For example, ABSS(-5,-3) is computed as event's firm average daily shorted shares in the 5 to 3 days prior to announcement date minus its median value of daily short selling of the entire period ; Model 2 is computed by the Market model : $v_{it} = V_{it} - (\propto_i + \beta_{it} V_{mt})$*; Model 3 is estimated by the Mean-adjusted abnormal shorting volume :* $v_{it} = V_{it} - \bar{V}_{it}$*. The event windows are [-15,-6], [-5,-3], [-2,-1], [0,1], and [2,10], with the estimation period of 100 days. CAR is measured by the difference between the event firm's daily return and S&P 500 equally weighted index on the same date. ***,**, and * indicate significance at the 1%, 5%, and 10% levels, respectively.*

In this study, I first examine abnormal short selling volume from 15 days prior to 10 days after credit rating downgrades are examined. According to Table 5, Panels A, B, and C displays the summaries of average abnormal short sale volume and cumulative abnormal return in the event windows [-15,-6], [-5,-3], [-2,-1], [0,1], and [2,10] for credit rating downgrades with and without credit watch placements estimated by three models. According to the results in Panel A, model 1, 2 and 3 show increases in abnormal short sale volume towards the date of credit rating downgrades announcement as the average values during event windows are increasing (from average abnormal short selling volume of 52.5691, 48.0900 and 41.1405 during 6 to 15 days before the announcement to 73.4676, 68.9900, 62.7202 during 1 to 2 days before the announcement, for Model 1,2, and 3 respectively). The average short sale volume are statistically significant for all event windows in all three models. The main results (Model1) and others support *H1* that short sale volume increase towards the dates of the announcement.

3.2 Informativeness of credit watch placements.

To check the informativeness of credit watch placement, short sellers reaction towards downgrades with and without the watch are observed. Credit rating downgrades are separated into two groups, those preceded by credit watch placement and those that are not preceded by credit watch placement. The result depicted in Panels B and C of Table 5 show that average abnormal short sale volume around those without negative watch placement are higher than those with credit watch placement in Model 1, which are significant at the 1% level. For example, average abnormal short sale volume during 15 to 6 days before the announcement (ABSS(-15,-6)) is 57.0270 for downgrades without negative watch placement and 11.0658 for downgrades with negative watch placement.

The abnormal short sellings are increasing and significant towards the dates of downgrade with negative watch placement for all three models.

Table 6. Difference in short selling between downgrades with and without negative watch placement

	Number of events	Average ABSS		
		(1)	(2)	(3)
Downgrades with negative watch placement	20	14.3740**	13.2933*	9.4270
Downgrades without negative watch placement (Surprise downgrades)	187	69.3019***	11.9566	36.8284*
Difference	207	54.9293***	-1.3409	27.1210
		(5.9674)	(-0.0144)	(1.6253)

*This table reports average abnormal short selling (ABSS), cumulative abnormal return (CAR%), and difference in means between downgrades with and without negative watch placement by event for model 1, 2, and 3. ***,**, and * indicate significance at the 1%, 5%, and 10% levels, respectively. T-statistics are reported in the parentheses.*

The difference in average short sale volume between two groups is reported in Table 6. ABSS for downgrades without negative watch placement for Model 1 (69.3019) is economically large and statistically significant at 1% level, while the two other models return small numbers. Credit rating events with negative watch placement are smaller and significant at the 1% level for Model 1, and not significant for Model 2 and 3. Interestingly, in Model 2, those with credit watch placement gives larger number of average shorted shares (13.2933) than those without (11.9566). The t-test for difference in mean is statistically significant at the 1% level for Model 1 only, while the rest are not significantly different. Therefore, the result from Model 1 supports *H2* which confirms that increase in abnormal short sale volume are larger when they are not preceded by credit

watch placement. The result from Model 2 and 3, on the other hand, do not support the *H2.*

3.3 Correlation between abnormal short sale volume (before the event) and returns (after announcement) or front running hypothesis.

As discussed earlier, the increase in abnormal short sale volume can either be a result of short sellers' abilities to process available information or there are informed short sellers in the market. In order to examine whether an increase in abnormal short volume are correlated with the increase in high trading activities, the regression model in Eq. (1) is used to study the interaction of short selling and returns around the announcement days. An increase in the level or short selling ahead of the announcement days and post announcement price should be negatively correlated. Therefore, the focus is on the relationship between ABSS(-2,-1) and CAR(0,1).

$$ABSS(-2,-1) = \beta_0 + \beta_1 Log(P0) + \beta_2 CAR(-2,-) + \beta_3 MOM + \beta_4 RATING + \beta_5 CAR(0,1) + \beta_6 AVOL + \varepsilon \quad (1)$$

Table 7 presents the correlations between variables of interest and control variables to be included in Eqs. (1) . ABSS(-15,-6), ABSS(-2,-1), and ABSS(-2,-1) are negatively correlated with share price on the announcement date ($Log(P_0)$). Correlation between ABSS(-2,-1) and CAR(0,1) is negative. In addition, ABSS(-15,-6) is positively correlated with ABSS(0,1) which shows persistence of short sale activities prior the announcements.

Table 7. Pearson's correlations matrix
(1)

Variables	ABSS(-15,-6)	ABSS(-2,-1)	ABSS(0,1)	CAR(-2,-1)	CAR(0,1)	MOM	RATING
ABSS(-2,-1)	0.873***	1.000					
ABSS(0,1)	0.866***	0.888***					
CAR(-2,-1)	0.370***	0.343***	0.431***				
CAR(0,1)	-0.041	-0.064	-0.004	0.031			
MOM	-0.218***	-0.225***	-0.213***	-0.051	0.112*		
RATING	0.367***	0.386***	0.273***	0.057	-0.202***	-0.139**	
LOG(P0)	-0.332***	-0.353***	-0.248***	0.031	0.001	0.197***	-0.635***

(2)

Variables	ABSS(-15,-6)	ABSS(-2,-1)	ABSS(0,1)	CAR(-2,-1)	CAR(0,1)	MOM	RATING
ABSS(-2,-1)	0.967***						
ABSS(0,1)	0.945***	0.967***					
CAR(-2,-1)	0.172**	0.210***	0.276***				
CAR(0,1)	-0.012	-0.024	-0.003	-0.207***			
MOM	-0.013	-0.024	-0.031	-0.333***	0.671***		
RATING	0.003	0.004	0.003	0.321***	-0.715***	-0.952***	
LOG(P0)	-0.112*	-0.168**	-0.141**	-0.069	0.143**	0.158**	-0.658***

(3)

Variables	ABSS(-15,-6)	ABSS(-2,-1)	ABSS(0,1)	CAR(-2,-1)	CAR(0,1)	MOM	RATING
ABSS(-2,-1)	0.877***						
ABSS(0,1)	0.759***	0.849***	1.000				
CAR(-2,-1)	0.100	0.151**	0.305***	1.000			
CAR(0,1)	-0.052	-0.060	-0.017	-0.207***	1.000		
MOM	-0.019	-0.034	-0.049	-0.333***	0.671***	1.000	
RATING	0.001	0.004	0.002	0.321***	-0.715***	-0.952***	1.000
LOG(P0)	-0.112*	-0.193***	-0.146**	-0.069	0.143**	0.158**	-0.658***

This table reports correlation matrix of variables of interest and controls to be included in the regression for all three models. The sample period is from January 2015 to December 2021. ABSS(-15,-6) is measured as event's firm average daily shorted shares in the 15 to 6 days prior to announcement date minus its median value of daily short selling of the entire period; ABSS(-2,-1) is measured as event's firm average daily shorted shares in the 2 days prior to announcement date minus its median value of daily short selling of the entire period; ABSS(0,1) is measured as event's firm average daily shorted shares in the 2 days following the announcement date minus its median value of daily short selling of the entire period; CAR(-2,-1) is the cumulative abnormal return in the 2-day preannouncement period and is measure by the event's firm cumulative total return in the 2 days prior the event over its median value of return over the entire sample period; CAR(0,2) is the cumulative abnormal return in the 2-day following the announcement and is measured by the event's firm cumulative total return in the 2 days following the event over its median value of return over the entire sample period; MOM is the event's firm six-month cumulative return on the day of and the day following the event minus the return on the S&P index during the same period; RATING is the numerical value of firm's credit rating on the

event day ; P_0 is the event day firm's stock price; ***,**, and * indicate significance at the 1%, 5%, and 10% levels, respectively. T-statistics are reported in the parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8 presents OLS regressions result from the estimation of Eqs. (1) from three models. For ABSS(-2,-1), the coefficients associated with the post-announcement abnormal return are negative but not significant for all models. This does not strongly support the notion that short sellers are able to foresee post event price movements. Furthermore, the negative coefficient with momentum effect indicates that short sellers short more when historical returns are negative. The results also show that abnormal volume is positively correlated to credit ratings and default risk (the higher numerical value means the lower rating and higher default risk).

Table 8. Regression results

	Dependent variable = ABSS(-15,-6)			**Dependent variable = ABSS(-5,-3)**			**Dependent variable = ABSS(-2,-1)**		
	Full sample			Full sample			Full sample		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
CAR(0,1)	0.2984	0.0255	-2.6152	0.5010	-0.2701	-2.9108	-0.7718	-0.7906	-3.4312
MOM	-50.5522*	-21.0390	-12.5371	-76.9595*	-47.5817	-39.0798	-74.0511*	-51.2939	-42.7920
RATING	8.6011**	9.1479	-1.6598	9.4273**	10.566	-0.2416	12.7396**	14.0321	3.2245
LOG(P0)	-19.8127*	-15.2341	-13.0816	-18.7698	-9.7775	-7.6251	-31.3667*	-22.9983	-20.8458*
CAR(-2,-1)	53.4455***	78.6505**	36.7579	86.4528***	64.8625*	-12.0300	72.7861***	95.5384**	30.6459*
Adj R2	0.1126	0.0253	0.0280	0.2005	0.0177	0.0153	0.2824	0.0618	0.0461

This table reports the Ordinary Lease Squares (OLS) estimation of equation (1) of variables of interest and controls variables for all 3 models. Model 1 is computed by the event's firm average daily shorted shares during the event window period minus its median value of daily short selling of the entire period. For example, ABSS(-5,-3) is measured as event's firm average daily shorted shares in the 5 to 3 days prior to announcement date minus its median value of daily short selling of the entire period ; Model 2 is computed by the Market model : $v_{it} = V_{it} - (\alpha_i + \beta_{it} V_{mt})$; Model 3 is estimated by the Mean-adjusted abnormal shorting volume :$v_{it} = V_{it} - \overline{V}_{it}$. ABSS(-15,-6) is measured as event's firm average daily shorted shares in the 15 to 6 days prior to announcement date minus its median value of daily short selling of the entire period; ABSS(-2,-1) is measured as event's firm average daily shorted shares in the 2 days prior to announcement date minus its median value of daily short selling of the entire period; ABSS(0,1) is measured as event's firm average daily shorted shares in the 2 days following the announcement date minus its median value of daily short selling of the entire period; CAR(-2,-1) is the cumulative abnormal return in the 2-day preannouncement period and is measure by the event's firm cumulative total return in the 2 days prior the event over its median value of return over the entire sample period; CAR(0,2) is the cumulative abnormal return in the 2-day following the announcement and is measured by the event's firm cumulative total return in the 2 days following the event over its median value of return over the entire sample period; MOM is the event's firm six-month cumulative return on the day of and the day following the event minus the return on the S&P index during the same period; RATING is the numerical value of firm's credit rating on the event day ; P_0 is the event day firm's

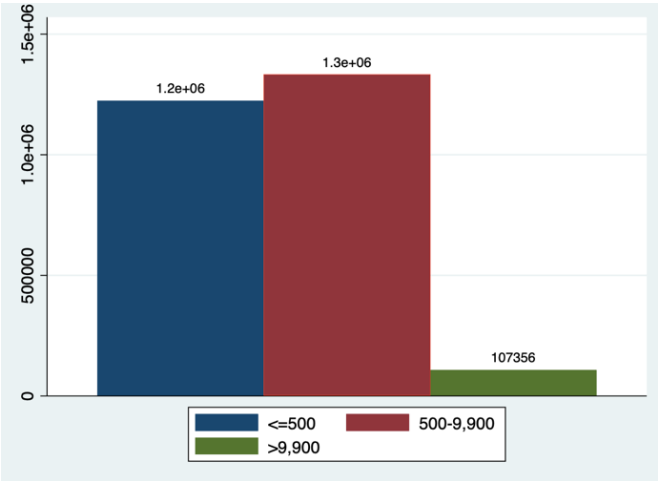
stock price***,**, and * indicate significance at the 1%, 5%, and 10% levels, respectively. T-statistics are reported in the parentheses. *** p<0.01, ** p<0.05, * p<0.1

Moreover, the evidence shows that cumulative abnormal return is positively and significantly correlated with the abnormal short sale activities before the event date (ABSS(-15,-6), ABSS(-5,-3), and ABSS(-2,-1)) for Model 1. According to these results, it cannot be concluded that short sellers are able to engage in the front running. This evidence does support *H3* that short sellers are informed.

3.4 Institutional vs retail investors.

In this section, the focus is on short sale volume among groups of investors. According to the previous section, it cannot be concluded that the high short sale volume is associated with the event. Even though the front running hypothesis is rejected, it is still be useful to explore the trade volume among group of investors, being institutional and retail investors. First, to separate short sellers who executed trades into two groups, trade size is used as a proxy. Fig. 2 shows a distribution of trade size during the entire sample period, which evidence that over 50% of trade volume is in the range of above 500 shares per transaction which is consistent with the market. With this evidence, the institutional investors are identified as the transaction with trade size of 500 and above, and retail investors are those with trade size less than 500 shares per transaction.

Figure 1. Trade size distribution



Distribution of trade size per transaction in the range of 1-500 shares, 501-9,900 shares, and more than 9,900 shares.

Table 9 reports the summaries of abnormal short selling for credit rating downgrades in the event windows [-15,-6], [-5,-3], [-2,-1], [0,1], and [2,10] from two group of investors. According to the results in Panel A and B, the level of abnormal short selling towards the date of credit rating downgrades announcement among the group of institutional investors are economically larger than those of retail investors for all three models. However, the ABSS are significant at the 1% level for all event windows. For model 2 and 3, abnormal short sale volume are increasing toward the announcement dates but the results are not statistically significant.

Table 9. Average abnormal short selling of retail and institutional investors.

	ABSS		
	(1)	(2)	(3)
Panel A. Retail investors (>500 shares per trade)			
-15 to -6	16.2759 ***	86.6507 ***	-5.7416

-5 to -3	20.1593 ***	86.8472 ***	-2.2518
-2 to -1	19.3449 ***	94.0257 **	-3.0193
0 to +1	27.8245 ***	109.5345 **	3.3633
+2 to +10	20.3269 ***	99.3041 ***	-2.7051
Panel B. Institutional investors (<=500 shares per trade)			
-15 to -6	56.2353 ***	123.4005 ***	31.0082 ***
-5 to -3	73.5539 ***	135.5724 ***	46.4734 **
-2 to -1	80.1862 ***	150.9168 **	53.8717 *
0 to +1	100.2864 ***	172.8911 **	66.7199 *
+2 to +10	78.6949 ***	152.0335 ***	50.0243 ***

This table reports the average abnormal short selling (ABSS) for two groups of investors estimated by three models; Model 1 is computed by the event's firm average daily shorted shares during the event window period minus its median value of daily short selling of the entire period. For example, ABSS(-5,-3) is measured as event's firm average daily shorted shares in the 5 to 3 days prior to announcement date minus its median value of daily short selling of the entire period ; Model 2 is computed by the Market model : $v_{it} = V_{it} - (\propto_i + \beta_{it} V_{mt})$; Model 3 is estimated by the Mean-adjusted abnormal shorting volume :$v_{it} = V_{it} - \overline{V}_{it}$. The event windows are [-15,-6], [-5,-3], [-2,-1], [0,1], and [2,10], with the estimation period of 100 days. CAR is measured by the difference between the event firm's daily return and S&P 500 equally weighted index on the same date. ***,**, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The difference in average short sale volume between two groups is reported in Table 10. Institutional ABSS of 62.3578, 135.7930, and 6.5570 are economically larger than those of retail investors. Both are statistically significant at 1% level, except for the short volume from retail investors in model 3. The t-test for difference in mean is statistically significant at the 1% level. These results show that institutional investors generate their short positions at a higher degree comparing to retail investors.

Table 10. Difference in short selling between the retail and institutional investors.

	Obs.	Average ABSS	
	(1)	(2)	(3)

Retail investors (<=500 shares per trade)	145	17.3009*** (5.7367)	90.3133*** (3.6280)	-4.8288 (-1.4698)
Institutional investors (>500 shares per trade)	145	62.3578*** (4.9085)	135.7930*** (4.2870)	6.5570*** (4.7220)
Difference		39.8294*** (-3.4516)	45.47966 (1.1289)	11.3858 (-4.9356)

This table reports the average abnormal short selling (ABSS), cumulative abnormal return(CAR%), and difference in mean between the group of retail and institutional investors. ***,**, and * indicate significance at the 10%, 5%, and 1% levels, respectively. T-statistics are reported in the parentheses.

However, the results cannot be generalized since greater level of abnormal short volume among retail investors could be a result of order splits initiated by institutional investors. To deal with this problem, the transactional data that occur at the same second (time) and same price are combined into one transaction. Table 12. Illustrates the number of small transactions that has been merged.

Table 11. Number of observations for each group of trade size

Group	Number of transactions before merging	Number of transactions after merging
Small (<=500)	4,900,260	3,942,479
Medium (500-9,900)	503,059	510,332
Large (>9,900)	14,635	16,086
Total	5,417,954	4,468,887

This table reports the number of observations for each group of trade size before and after combining data with same price and time.

Table 12 reports the summaries of abnormal short selling in the event windows [-15,-6]], [-5,-3], [-2,-1], [0,1], and [2,10] for credit rating downgrades for different trade sizes for all three models. According to the results in Panel A and B, the level of abnormal short selling towards the date of credit rating downgrades announcement among all group of trade size are increasing and significant at 10% level. A group of medium trade sizes are economically largest, followed by the large and small trade sizes. For all above evidence, it can be concluded that institutional investors or the of investors that initiated trades of more than 500 shares per transaction increase their short positions as the days approach the event day. This result is consistent with *H4* but it cannot be concluded that the increase in the short volume is a result of them being informed.

Table 12. Average abnormal short selling (ABSS) by trade sizes

	ABSS		
	(1)	(2)	(3)
Panel A. Downgrades for small trade sizes (<=500)			
-15 to -6	13.5252 ***	82.9271 ***	-0.2490
-5 to -3	18.7033 ***	84.6215 ***	3.3237
-2 to -1	19.1343 ***	94.9563 **	7.6818
0 to +1	26.7776 ***	108.4460 **	13.8359
+2 to +10	18.7875 ***	100.6751 ***	6.4806
Panel B. Downgrades medium trade sizes (500-9,900)			
-15 to -6	94.259 ***	105.8028 ***	22.6267 ***
-5 to -3	162.899 **	103.9474 ***	22.6495 *
-2 to -1	190.275 **	123.7737 *	36.4992
0 to +1	335.1972 ***	135.9258 *	41.3157

+2 to +10	169.1837 ***	131.9823 ***	37.8265 ***
Panel C. Downgrades for large trade sizes (>9,900)			
-15 to -6	43.0177 **	72.7376 ***	-10.4385
-5 to -3	58.9518 ***	73.7018 ***	-7.5960
-2 to -1	77.2249 ***	79.7329 *	-7.5416
0 to +1	100.9511 ***	89.1403 **	-5.4698
+2 to +10	73.4069 **	87.9763 ***	-6.1795

This table reports the average abnormal short selling (ABSS) for three categories of trade sizes (small, medium, and large) estimated by three models; Model 1 is computed by the event's firm average daily shorted shares during the event window period minus its median value of daily short selling of the entire period. For example, ABSS(-5,-3) is measured as event's firm average daily shorted shares in the 5 to 3 days prior to announcement date minus its median value of daily short selling of the entire period ; Model 2 is computed by the Market model : $v_{it} = V_{it} - (\propto_i + \beta_{it} V_{mt})$; Model 3 is estimated by the Mean-adjusted abnormal shorting volume :$v_{it} = V_{it} - \bar{V}_{it}$. The event windows are [-15,-6], [-5,-3], [-2,-1], [0,1], and [2,10], with the estimation period of 100 days. CAR is measured by the difference between the event firm's daily return and S&P 500 equally weighted index on the same date. ***,**, and * indicate significance at the 10%, 5%, and 1% levels, respectively.

4. Conclusions

4.1 Conclusions

In this study, there are three models used to estimate the abnormal short volume. Model 1 used a straightforward method by subtracting V_{it} from the median level of volume over the entire sample period of 7 years. The second model applied the market model by using 50 days prior the event and 50 days after the event to estimate expected normal return. Lastly, Model 3 used the mean of volume diring estimation period to define normal volume. The result in H1 follows previous literatures, like those of Christophe et al. (2004); Daske et al. (2005); Diether et al. (2005) that short sellers increase their short position towards the date of announcement. It is also found that investors short sell more around credit ratings event that are not preceded by credit watch placement.

Rating downgrades that are preceded with watch placement are not new information as it provides longer time for investors to absorb more information. The result is consistent with Chiyachantana et al., who documents that credit watch placement provides new information to the market participants. Moreover, the evidence shows negative relationship between pre-announcement abnormal short sale volume and post and post-announcement abnormal return. However, the result is not statistically significant so it cannot be concluded that the heavy short sale volume is a result of short sellers being informed. Lastly, from the findings, institutional investors increase their short sale activities towards the downgrades announcement. However, it cannot be concluded that the increase in their short position come from their possession of private information. Many literatures document that institutional investors are more sophisticated at predicting forthcoming negative announcements.

The difference in results from three models came from the difference approaches of estimating expected volume. In the first model, the entire sample period of 7 years are used to calculate the median, and it is not affected by outliers. For the market model and mean adjusted, 100 days estimation period are taken into account which is difficult to control for other confounding effects.

In conclusion, my result suggest that short sellers are not informed, but there is a strong evidence of increase in their short position prior credit rating downgrades. Moreover, Institutional investors or medium or large trade size increase their short position more than smaller trade sizes. However, the possibility of informed short selling is no excluded in this evidence. Christophe et al. (2010) suggest that if short sellers have their

own analysis regarding a downgrade, the amount of abnormal short selling should moderately increase towards the announcement, because it is not likely that all short sellers take acting in the same timeframe. Contrarily, if short sellers receive assistance a few days before negative announcements, abnormal short volume would grow before the downgrades.

4.2 Limitations

The contribution of this study is to examine the short sale volume between two group of investors by using trade size as a proxy. However, this part relies heavily on the transactional data. The off-hour trading data is obtained from FINRA which is publicly available to download through its website. The data does not indicate or identify the whether it's an individual or organization that executed the trades. There are no recent papers that indicates the trade size cut-offs. The most recent papers are in the late 90's which are not practical. With this reason, the trade size distribution needs to be taken into account. Therefore, some studies in the future can complete this gap by providing more detailed transactional data for more insightful results.

REFERENCES

Ajinkya, B. B., & Jain, P. C. (1989). The behavior of daily stock market trading volume. *Journal of accounting and economics*, *11*(4), 331-359.

Alanis, E., Payne, J., & Picard, J. (2020). Managing for Ratings: Real Effects of a Corporate Ratings Criteria Change. *Journal of Financial Research*, *43*(4), 821-845. https://doi.org/10.1111/jfir.12226

Bae, K. H., Tan, H., & Welker, M. (2008). International GAAP differences: The impact on foreign analysts. *The Accounting Review*, *83*(3), 593-628.

Bae, K. h., Yamada, T., & Ito, K. (2006). How do individual, institutional, and foreign investors win and lose in equity trades? Evidence from Japan. *International Review of Finance*, *6*(3-4), 129-155.

Barber, B. M., Lee, Y.-T., Liu, Y.-J., & Odean, T. (2009). Just how much do individual investors lose by trading? *The Review of Financial Studies*, *22*(2), 609-632.

Barclay, M. J., & Warner, J. B. (1993). Stealth trading and volatility: Which trades move prices? *Journal of financial Economics*, *34*(3), 281-305.

Blau, B. M., & Pinegar, J. M. (2013). Are short sellers incrementally informed prior to earnings announcements? *Journal of Empirical Finance*, *21*, 142-155.

Blau, B. M., & Wade, C. (2012). Informed or speculative: Short selling analyst recommendations. *Journal of Banking & Finance*, *36*(1), 14-25. https://doi.org/10.1016/j.jbankfin.2011.06.001

Boehmer, E., & Kelley, E. K. (2009). Institutional Investors and the Informational Efficiency of Prices. *Review of Financial Studies*, *22*(9), 3563-3594. https://doi.org/10.1093/rfs/hhp028

Campbell, C. J., & Wasley, C. E. (1996). Measuring abnormal daily trading volume for samples of NYSE/ASE and NASDAQ securities using parametric and nonparametric test statistics. *Review of Quantitative Finance and Accounting*, *6*(3), 309-326.

Chakravarty, S. (2001). Stealth-trading: Which traders' trades move stock prices? *Journal of Financial Economics*, *61*(2), 289-307.

Chan, K., Menkveld, A. J., & Yang, Z. (2007). The informativeness of domestic and foreign investors' stock trades: Evidence from the perfectly segmented Chinese market. *Journal of Financial Markets*, *10*(4), 391-415.

Chiyachantana, C. N., Manitkajornkit, E., & Taechapiroontong, N. (2014). Credit watch placement and security price behavior around bond rating revisions. *Investment Management and Financial Innovations*, *11*(1), 18.

Choe, H., Kho, B.-C., & Stulz, R. M. (2005). Do domestic investors have an edge? The trading experience of foreign investors in Korea. *The Review of Financial Studies*, *18*(3), 795-829.

Christophe, S. E., Ferri, M. G., & Angel, J. J. (2004). Short-Selling Prior to Earnings Announcements. *The Journal of Finance*, *59*(4), 1845-1876. https://doi.org/10.1111/j.1540-6261.2004.00681.x

Christophe, S. E., Ferri, M. G., & Hsieh, J. (2010). Informed trading before analyst downgrades: Evidence from short sellers. *Journal of financial Economics*, *95*(1), 85-106. https://doi.org/https://doi.org/10.1016/j.jfineco.2009.02.004

Chuang, W.-I., & Susmel, R. (2011). Who is the more overconfident trader? Individual vs. institutional investors. *Journal of Banking & Finance*, *35*(7), 1626-1644.

Chung, C. Y., Kim, H., & Ryu, D. (2017). Foreign investor trading and information asymmetry: Evidence from a leading emerging market. *Applied Economics Letters*, *24*(8), 540-544.

Cready, W. M., & Ramanan, R. (1991). The power of tests employing log-transformed volume in detecting abnormal trading. *Journal of Accounting and Economics*, *14*(2), 203-214.

Daske, H., Richardson, S. A., & Tuna, A. I. (2005). Do Short Sale Transactions Precede Bad News Events? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.722242

Diamond, D. W., & Verrecchia, R. E. (1987). Constraints on short-selling and asset price adjustment to private information. *Journal of financial Economics*, *18*(2), 277-311. https://doi.org/10.1016/0304-405x(87)90042-0

Diether, K. B., Lee, K.-H., & Werner, I. M. (2005). Can Short-sellers Predict Returns? Daily Evidence. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.761666

Dvořák, T. (2005). Do domestic investors have an information advantage? Evidence from Indonesia. *The Journal of Finance*, *60*(2), 817-839.

Elliott, J., Morse, D., & Richardson, G. (1984). The Association between Insider Trading and Information Announcements. *The RAND Journal of Economics*, *15*(4). https://doi.org/10.2307/2555523

Engelberg, J. E., Reed, A. V., & Ringgenberg, M. C. (2012). How are shorts informed?: Short sellers, news, and information processing. *Journal of financial Economics*, *105*(2), 260-278. https://doi.org/https://doi.org/10.1016/j.jfineco.2012.03.001

Even-Tov, O., & Ozel, N. B. (2021). What moves stock prices around credit rating changes? *Review of Accounting Studies*, *26*(4), 1390-1427. https://doi.org/10.1007/s11142-020-09573-6

Feng, X., & Chan, K. C. (2016). Information advantage, short sales, and stock returns: Evidence from short selling reform in China. *Economic Modelling*, *59*, 131-142. https://doi.org/10.1016/j.econmod.2016.07.007

Froot, K. A., & Ramadorai, T. (2008). Institutional portfolio flows and international investments. *The Review of Financial Studies*, *21*(2), 937-971.

Goh, J. C., & Ederington, L. H. (1993). Is a Bond Rating Downgrade Bad News, Good News, or No News for Stockholders? *The Journal of Finance*, *48*(5), 2001-2008. https://doi.org/10.1111/j.1540-6261.1993.tb05139.x

Griffin, P. A., & Sanvicente, A. Z. (1982). Common Stock Returns and Rating Changes: A Methodological Comparison. *The Journal of Finance*, *37*(1), 103-119. https://doi.org/10.1111/j.1540-6261.1982.tb01098.x

Grinblatt, M., & Keloharju, M. (2000). The investment behavior and performance of various investor types: a study of Finland's unique data set. *Journal of financial Economics*, *55*(1), 43-67.

Hand, J. R. (1990). A test of the extended functional fixation hypothesis. *Accounting Review*, 740-763.

Hau, H. (2001). Location matters: An examination of trading profits. *The Journal of Finance*, *56*(5), 1959-1983.

He, Y., Wang, J., & Wei, K. J. (2011). Do bond rating changes affect the information asymmetry of stock trading? *Journal of Empirical Finance*, *18*(1), 103-116.

Henry, T. R., Kisgen, D. J., & Wu, J. J. (2015). Equity short selling and bond rating downgrades. *Journal of Financial Intermediation*, *24*(1), 89-111.

Holthausen, R. W., & Leftwich, R. W. (1986). The effect of bond rating changes on common stock prices. *Journal of financial Economics*, *17*(1), 57-89. https://doi.org/10.1016/0304-405x(86)90006-1

Huang, R. D., & Shiu, C. Y. (2009). Local effects of foreign ownership in an emerging financial market: Evidence from qualified foreign institutional investors in Taiwan. *Financial Management*, *38*(3), 567-602.

Irvine, P., Lipson, M., & Puckett, A. (2007). Tipping. *The Review of Financial Studies*, *20*(3), 741-768.

Kamesaka, A., Nofsinger, J. R., & Kawakita, H. (2003). Investment patterns and performance of investor groups in Japan. *Pacific-Basin Finance Journal*, *11*(1), 1-22.

Kaniel, R., Saar, G., & Titman, S. (2007). *Individual investor trading and stock returns*. Citeseer.

Karpoff, J. M., & Lee, D. (1991). Insider Trading before New Issue Announcements. *Financial Management*, *20*(1). https://doi.org/10.2307/3666093

Ke, B., Huddart, S., & Petroni, K. (2003). What insiders know about future earnings and how they use it: Evidence from insider trades. *Journal of accounting and economics*, *35*(3), 315-346. https://doi.org/10.1016/s0165-4101(03)00036-3

Kedia, S., & Zhou, X. (2014). Informed trading around acquisitions: Evidence from corporate bonds. *Journal of Financial Markets*, *18*, 182-205. https://doi.org/10.1016/j.finmar.2013.07.002

Kisgen, D. J. (2006). Credit ratings and capital structure. *The Journal of Finance*, *61*(3), 1035-1072.

Lee, C. M., & Radhakrishna, B. (2000). Inferring investor behavior: Evidence from TORQ data. *Journal of Financial Markets*, *3*(2), 83-111.

Lee, S., & Jung, H. (2016). The effects of corporate social responsibility on profitability: The moderating roles of differentiation and outside investment. *Management Decision*.

Meng, Q., Li, Y., Jiang, X., & Chan, K. C. (2017). Informed or speculative trading? Evidence from short selling before star and non-star analysts' downgrade announcements in an emerging market. *Journal of Empirical Finance*, *42*, 240-255. https://doi.org/10.1016/j.jempfin.2017.04.003

Ng, L., & Wu, F. (2007). The trading behavior of institutions and individuals in Chinese equity markets. *Journal of Banking & Finance*, *31*(9), 2695-2710.

Nofsinger, J. R., & Sias, R. W. (1999). Herding and feedback trading by institutional and individual investors. *The Journal of Finance*, *54*(6), 2263-2295.

Richards, A. (2005). Big fish in small ponds: The trading behavior and price impact of foreign investors in Asian emerging equity markets. *Journal of Financial and quantitative Analysis*, *40*(1), 1-27.

Scott, S. D., Hirschinger, L. E., Cox, K. R., McCoig, M., Brandt, J., & Hall, L. W. (2009). The natural history of recovery for the healthcare provider "second victim" after adverse patient events. *BMJ Quality & Safety*, *18*(5), 325-330.

Shi, J., Wang, J., & Zhang, T. (2017). Are Short Sellers Informed? Evidence from Credit Rating Agency Announcements. *Journal of Financial Research*, *40*(2), 179-221. https://doi.org/10.1111/jfir.12121

Walther, B. R. (1997). Investor sophistication and market earnings expectations. *Journal of Accounting Research*, *35*(2), 157-179.

Wei, J., & Zhou, X. (2016). Informed Trading in Corporate Bonds Prior to Earnings Announcements [https://doi.org/10.1111/fima.12123]. *Financial Management*, *45*(3), 641-674. https://doi.org/https://doi.org/10.1111/fima.12123

Williams, G., Alsakka, R., & ap Gwilym, O. (2013). The impact of sovereign rating actions on bank ratings in emerging markets. *Journal of Banking & Finance*, *37*(2), 563-577. https://doi.org/10.1016/j.jbankfin.2012.09.021

Yang, H., Ahn, H.-J., Kim, M. H., & Ryu, D. (2017). Information asymmetry and investor trading behavior around bond rating change announcements. *Emerging Markets Review*, *32*, 38-51. https://doi.org/10.1016/j.ememar.2017.05.004

VITA

NAME	Omtong Kasemsant
DATE OF BIRTH	07 June 1993
PLACE OF BIRTH	Bangkok
INSTITUTIONS ATTENDED	Chulalongkorn University
HOME ADDRESS	20/64 La Vie En Rose Place, Sukhumvit 36, Klong Tan, Klong Toey, 10110