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THE INFORMATION CONTENT OF OPTION TRADING AND LIQUIDITY RISK

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ABSTRACT

This paper presents strong evidence to show that stock liquidity and option liquidity play important roles in explaining the information content of options trading for future stock returns. Using implied volatility skew to capture the option trading activity of informed traders, we provide a clear and negatively predictive linkage between option trading and stock returns. The negatively predictive relation between options trading activity and stock returns is particularly accentuated for stocks with lower liquidity. This shows that lower levels of stock liquidity increase the amount of informed trading activity in the option market, and stock is slow to incorporate information embedded in option trading activities. In addition, the predictive ability of option trading activity tends to increase with option liquidity, for each level of stock liquidity. The empirical results are sufficiently robust for different liquidity measures.

JEL: G12, G14, G17

KEYWORDS: Stock Liquidity, Option Liquidity, Information Content, Option Trading

INTRODUCTION

Private information gives investors a significant trading advantage. Options offer several advantages over stocks, including high leverage and built-in downside protection, making them particularly attractive to informed traders. If informed traders indeed use the option market as a venue for trading based on private information, option trading will convey private information to market participants, which may be useful for predicting underlying stock price movements. Many empirical studies have clearly documented the predictive characteristics of information from option trading activities for stock returns (e.g., Chakravarty et al., 2004; Cremers and Weinbaum, 2010; Lin and Lu, 2015).

Liquidity level impacts trading speed and transaction costs, and thus affects trading profits and trading strategy (e.g., Pastor and Stambaugh, 2003). This raises the issue that when informed traders seek to maximize profits by exploiting private information, the underlying stock with a lower liquidity level might increase the amount of informed trading activity in the option market. We expect that increased informed trading in the options market may lead to higher predictability for stock returns if prices adjust more slowly. However, this may also cause market makers to aggressively update their beliefs and quickly adjust prices, resulting in a faster incorporation of information to stock prices and a reduction in the option trading predictability. (e.g., Pan and Poteshman, 2006). Thus, it is necessary to further examine the effect of underlying stock liquidity on the informational linkage between option trading activities and future stock returns. In addition, option liquidity may potentially impact informed trader activities. This paper considers option liquidity based on the argument that the informational advantage of some traders might lead to a higher demand for certain options (e.g., Xing et al., 2010). For option liquidity with observable risk, it is particularly important to understand the interactive effect of stock and option liquidity on the informed trader behavior. However, such studies on the role of option liquidity are important but still rare. This paper fills this gap by concentrating on the predictive link between option trading activities and future stock returns and the impact of stock liquidity and option liquidity.

This paper contributes to the literature that examines the information relation between options markets and stock markets. It extends and differs from previous studies in two important aspects. First, we provide a more comprehensive empirical study to test the predictive ability of option trading activities for future stock returns, along with the role of stock liquidity and option liquidity. Although we expect that lower levels of underlying stock liquidity and higher option liquidity may increase informed trading activity in the options market, there are two possible scenarios. One is that increased informed trading in the options market will lead to higher predictability for stock returns if prices adjust at a slower rate. On the other hand, options trading conveying more information for future stock price movements may cause stock markets to efficiently incorporate new information from the options market, thus reducing the lead-lag predictability from option trading to stock returns. Thus, this paper further investigates the interaction effect of stock and option liquidity on the behavior of informed traders. Second, we adopt several liquidity measures, such as trading volume and price impact measures, as proxies for the levels of stock liquidity and option liquidity. Aitken and Comerton-Forde (2003) show that studies using different liquidity measures are likely to reach very different conclusions. This motivates us to adopt different liquidity measures and enables us to test whether the liquidity effect is sufficiently robust for different liquidity measures.

We use the implied volatility skew (IVSKEW) proposed by Xing et al. (2010) to capture informed option trading. Implied volatility skew is defined as the difference between the implied volatility of out-of-the-money (OTM) put options and at-the-money (ATM) call options. Xing et al. (2010) show that the price-based implied volatility skew is driven by informed trades and that its value can represent the strength of a trader's convictions. Intuitively, investors tend to choose OTM puts to express worries about possible future negative jumps. Consequently, OTM puts become more expensive before large negative jumps, resulting in an increase in the implied volatility skew. The high pressure for puts and steep volatility skew suggest future negative stock returns.

Data sources include daily records of options and stock trades for the component stocks of the S&P 1500 indexes from the beginning of January 2013 through the end of December 2017. Three liquidity measures are investigated: dollar trading volume, absolute stock return over dollar trading volume, and absolute change in daily stock price over dollar trading volume. Our paper presents several results that are new to the literature. First, the empirical results clearly show that there is a lead-lag predictive linkage from option trading activity to future stock returns, indicating a gradual process through which stock prices adjust to information from option trading. As the underlying stock liquidity decreases in the stock market, the predictability of IVSKEW is stronger, regardless of which liquidity measure is used. The results suggest that stock is slow to incorporate information embedded in option trading activities. Second, both stock liquidity and option liquidity affect the information content of option trading activity for future stock returns. The empirical results indicate that the underlying stock liquidity plays more important role than the option liquidity in explaining the information transmission between option and stock markets. Third, our analysis show that the negative predictive relation between option trading and stock returns is particularly remarkable for stocks with lower liquidity and options with higher liquidity. In addition, the predictive ability of option trading activity tends to increase with option liquidity for each level of stock liquidity.

The remainder of this paper is organized as follows. We first present the literature review, and then describe the empirical data, proxies for informed option trading and measures for stock and option liquidity. Finally, we present the empirical results and provide conclusions.

LITERATURE REVIEW

Black (1975), Diamond and Verrecchia (1987), and Mayhew et al. (1995) argue that the options market provides informed traders with incremental advantages over stock markets. Thus, options may play an important informational role in predicting future stock returns (e.g., Easley et al., 1998). Many empirical studies have documented the ability of option trading activities' information to predict stock returns. A

recent stream of empirical papers has documented several factors that can help explain the informational linkage between option trading activities and future stock price movements. Pan and Poteshman (2006) adopt a measure of the probability of information-based trading proposed by Easley et al. (2002) to show that a higher prevalence of informed traders lead to a higher predictability level of stock returns. Lin and Lu (2015) investigate the role of analysts and option traders in the informational linkage between options and the stock market. They show that a significant proportion of option predictability on stock returns comes from informed option traders' information about upcoming analyst-related news.

Liquidity level is defined as the ability to quickly trade large quantities of stock shares at low costs without changing stock prices. Thus, liquidity impacts trading speed, transaction costs, and trading profits (e.g., Chordia et al., 2000; Pastor and Stambaugh, 2003; Cetin et al., 2006). Informed traders exploit private information to maximize trading profits and minimize transaction costs. Therefore, it is reasonable to assume that underlying stock liquidity and option liquidity may be potential impact factors on the activities of informed traders.

Previous studies have offered a wide variety of measures for liquidity (e.g., Amihud, 2002; Acharya and Pedersen, 2005; Cao and Wei, 2010; Hu et al., 2013). Amihud (2002) adopt the stocks of the daily ratio of absolute stock return to dollar volume to measure the stock illiquidity. Chordia et al. (2000) use several different liquidity measures—the quoted and effective bid–ask spread, the proportional quoted and effective spreads, and the quoted depth—to study the commonality in liquidity. Cao and Wei (2010) employe various measures based on the bid–ask spread, trading volumes, and price impact to study liquidity commonality in the option market. Aitken and Comerton-Forde (2003) discover that different studies using a variety of liquidity measures were likely to reach very different conclusions. This motivates us to adopt and test the robustness of different liquidity measures.

DATA AND METHODOLOGY

Data

The data used for this study consists of daily option and stock records for the component stocks of the S&P 1500 index from the beginning of January 2013 through the end of December 2017. Market prices for options and stocks are obtained from CBOE, Compustat and Yahoo Finance. The exclusion filters used to construct our empirical data are as follows: (i) Stock price is lower than $5 or its daily volume is zero. (ii) Options with price quotes are lower than $0.125. (iii) Option contracts have zero open interests. (iv) The implied volatility of the options is lower than 0.03 or higher than 2. (v) Options have maturities are less than 10 days or greater than 360 days.

Measures for Option Trading Activities of Informed Traders

This paper uses the implied volatility skew (IVSKEW) proposed by Xing et al. (2010) to examine the information content of option trading activities for predicting stock returns. Xing et al. (2010) showed that IVSKEW is driven by informed traders and the value can present the strength of a trader's convictions. The IVSKEW for firm i at day t is defined as the difference between the implied volatility of OTM puts, and ATM calls. A put option is defined as OTM when the moneyness is lower than 0.95 and higher than 0.8, while a call option is defined as ATM when the moneyness is between 0.95 and 1.05. The moneyness is defined as the ratio of strike price to the stock price. We compute a volume-weighted volatility skew measure, and the weekly IVSKEW is calculated by averaging the daily IVSKEW over a week.

Intuitively, investors tend to choose OTM puts to express their concerns about possible future negative jumps. Consequently, OTM puts become more expensive before large negative jumps. That is, a higher implied volatility skew in individual options would reflect a greater risk of negative price jumps. The high

pressure for puts shows that the information advantage of some options traders might be the reason for the observed predictability and induce an increased IVSKEW. Therefore, if informed traders indeed prioritize the options market as a venue for information-based trading, we expect that the IVSKEW will be negatively associated with future stock returns.

Measures for Stock Liquidity and Option Liquidity

In this paper, we follow Cao and Wei (2010) in using three proxies for firm-specific stock liquidity and option liquidity. The first and second proxies are the price-impact illiquidity measures (AILLIQ and PILLIQ), and the third proxy. For stocks, S_t denotes the stock prices at time t, VOL_t denotes the trading volume at time t, $DVOL_t$ denotes the dollar trading volume at time t, AILLIQ is the ratio of absolute change in asset price on dollar trading volume and PILLIQ is the percentage change in daily stock prices divided by the dollar trading volume. For options, the dollar trading volume is the midpoint of the bid and ask quotes times the trading volume summed over all the options in a day, and AILLIQ (PILLIQ) is calculated similarly as the stock's AILLIQ (PILLIQ), but the absolute (percentage) change in option prices is adjusted by the option's delta times the change in the stock prices, using the trading volume for each option to calculate a volume-weighted average measure. Intuitively, low liquidity can be interpreted as a big price response with a modest trading volume, compared to a perfectly liquid market. Thus, an asset with a lower liquidity level will have higher values of AILLIQ and PILLIQ.

Table 1: Definitions of Stock Liquidity and Option Liquidity Measures

Definitions of Liquidity Measures	Option	Stock
AILLIQ	$\frac{\sum_{j=1}^{N} VOL_j \times \frac{\lvert(P_t^j - P_{t-1}^j) - \Delta_{t-1}^j(S_t - S_{t-1})\rvert}{DVOL_t^j}}{\sum_{j=1}^{N} VOL_j}$	$\frac{\lvert S_t - S_{t-1}\rvert}{DVOL_t}$
PILLIQ	$\frac{\sum_{j=1}^{N} VOL_j \times \frac{\lvert(P_t^j - P_{t-1}^j) - \Delta_{t-1}^j(S_t - S_{t-1})\rvert / P_{t-1}^j}{DVOL_t^j}}{\sum_{j=1}^{N} VOL_j}$	$\frac{\lvert S_t - S_{t-1}\rvert / S_{t-1}}{DVOL_t}$
DVOL	$\sum_{j=1}^{N} VOL_j \times (ask_j + bid_j)/2$	$VOL_t \times (ask + bid)/2$

This table presents the definitions of stock liquidity and option liquidity measures.

Table 2 reports the descriptive statistics for three stock and option liquidity portfolios for each liquidity measure. For each measure, we first compute the daily liquidity measure and then average it over a week to compute the weekly liquidity measure. The stocks (options) are sorted by the level of stock (option) liquidity at the end of each week and assigned into three liquidity portfolios. Portfolio 1 (Portfolio 3) had the lowest (highest) level of stock and option liquidity. We first calculate the cross-sectional average liquidity for each liquidity group and then calculate the time-series means and standard deviations.

Table 2: Summary Statistics of The Stock and Option Liquidity Measures

Measures	**Stock Liquidity**				**Option Liquidity**			
	All	**Portfolio 1**	**Portfolio 2**	**Portfolio 3**	**All**	**Portfolio 1**	**Portfolio 2**	**Portfolio 3**
Panel A: AILLIQ ($x10^{-7}$)					**AILLIQ ($x10^{-2}$)**			
Mean	0.26	0.63	0.12	0.03	1.86	4.50	0.88	0.22
Std. Dev.	0.03	0.08	0.02	0.01	0.25	0.55	0.17	0.06
Panel B: PILLIQ ($x10^{-7}$)					**PILLIQ ($x10^{-2}$)**			
Mean	0.76	2.00	0.24	0.05	1.41	3.28	0.74	0.22
Std. Dev.	0.11	0.30	0.05	0.01	0.17	0.39	0.12	0.04
Panel C: DVOL($x10^{7}$)					**DVOL($x10^{3}$)**			
Mean	10.76	1.22	5.52	25.69	3.46	0.05	0.58	9.84
Std. Dev.	1.51	0.22	0.89	3.53	0.46	0.01	0.12	1.27

This table reports the summary statistics of stock and option liquidity measure. Portfolio 1 (Portfolio 3) had the lowest (highest) level of liquidity. The mean and standard deviation of each liquidity measure are reported for all samples and for three portfolios.

EMPIRICAL RESULTS

Relationship Between Informed Option Trading and Stock Returns

We begin by investigating whether informed traders indeed prioritize the options market as a venue for information-based trading. Our basic model follows the methodology proposed by Xing et al. (2010) to conduct a Fama-MacBeth (1973) regression:

$$R_{i,t} = \alpha_t + \beta_t IVSKEW_{i,t-1} + \delta_t Controls_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the return on firm i for week t, $IVSKEW_{i,t-1}$ is the implied volatility skew for firm i in week t-1, and $Controls_{i,t-1}$ are the control variables for firm i observed at week t-1 including log firm market capitalization, the previous 1-month stock return, and the underlying return volatility calculated using the previous month's daily return.

We adopt the Fama-MacBeth (1973) regression and the t-statistics is estimates based on Newey-West (1987). Table 3 presents the results. The estimated coefficient of the IVSKEW is negative and significant at the 5% level. The empirical evidence is consistent with previous findings that option transactions could convey private information to market participants for predicting underlying stock price movement (e.g., Xing et al., 2010; Pan and Poteshman, 2006; Hu, 2014).

Table 3: Predictive Relations Between Option Trading Activity and Stock Returns

Independence Variables	**Basic Model**	
	Coeff.	***t*-stat.**
Intercept	0.208	3.538
IVSKEW	-0.086	-4.273**
Controls	Yes	
Adj R^2	20.07%	

*This table provides the predictability of option trading activity on the stock returns. We use the Fama-MacBeth (1973) regression and the t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at 10% and 5% levels.*

Effect of Stock Liquidity and Option Liquidity

This subsection first investigates the role of stock liquidity level on the predictive ability of option trading activity on stock returns. Informed traders exploit private information seeking to maximize trading profits

and minimize transaction costs. We may expect that stocks with lower stock liquidity might prompt increased informed trading in the options market.

We adopt the Fama-MacBeth (1973) regression and add interaction terms of the stock liquidity measures with informed option trading measures to test whether the information content of option trading activities for future stock price movements are related to the level of stock liquidity. In addition, we also test whether the effect of liquidity level on the predictive information of option trading activities for stock returns is sensitive to the measure of illiquidity being used. Our theoretical model provides specific predictions as follows:

$$R_{i,t} = \alpha_t + \left(\beta_{1t} + \beta_{2t}\, LIQ_{i,t-1}^{Stock}\right) \times IVSKEW_{i,t-1} + \delta_t Controls_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where $R_{i,t}$ is the return on firm i for week t, $LIQ_{i,\mathrm{t}-1}^{Stock}$ is the level of stock liquidity measure for firm i in week t-1 (AILLIQ, PILLIQ, and DVOL), $IVSKEW_{i,t-1}$ is the implied volatility skew for firm i in week t-1, and $Control_{i,t-1}$ is the control variables for firm i observed at week t-1 including option liquidity, log firm market capitalization, the previous 1-month stock return, and the underlying return volatility calculated using the previous month's daily return.

Given stocks with different liquidity levels, the predictive coefficient of option trading activity for stock returns becomes $\beta_{1t} + \beta_{2t}\, LIQ_{i,\mathrm{t}-1}^{Stock}$. If lower liquidity levels for the underlying stock can improve the predictive ability of option trading activities for stock returns, β_{2t} should be negative and statistically significant. On the contrary, if the liquidity of the underlying stock is not a determinant for the presence of informed trading in the options market, we may not find any statistical significance in β_{2t}.Table 4 documents the results for the effect of stock liquidity on the predictive ability of IVSKEW for stock returns. Looking at the estimated coefficients on the $IVSKEW_{i,t-1}$ and the interaction terms $LIQ_{i,\mathrm{t}-1}^{Stock} \times IVSKEW_{i,t-1}$, the coefficients all carry a negative sign and coefficients are significant for AILLIQ and PILLIQ. The coefficient β_{2t} is positive and significant for DVOL. This finding of interaction between IVSKEW and stock liquidity indicates that as the underlying stock liquidity decreases in the stock market, the predictability of IVSKEW is stronger, regardless of which liquidity measure is used.

Table 4: The Effect of Stock Liquidity

Independence Variables	**Models**	
	Coeff.	***t*-stat.**
Panel A: AILLIQ		
Intercept	0.203	3.416**
IVSKEW	-0.046	-1.912*
$LIQ^{Stock} \times IVSKEW$	-0.081	-2.064**
Controls	Yes	
Adj R^2	22.49%	
Panel B: PILLIQ		
Intercept	0.208	3.539**
IVSKEW	-0.046	-1.902*
$LIQ^{Stock} \times IVSKEW$	-0.019	-1.968**
Controls	Yes	
Adj R^2	20.54%	
Panel C: DVOL		
Intercept	0.222	3.466**
IVSKEW	-0.114	-4.805**
$LIQ^{Stock} \times IVSKEW$	0.011	3.471**
Controls	Yes	
Adj R^2	20.26%	

*This table reports the results of the Fama-MacBeth (1973) regression. The t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at the 10% and 5% levels.*

This paper further investigates the impact of option liquidity on the predictive ability of option trading activity on stock returns. Similar to the analysis of stock liquidity, we adopt the Fama-MacBeth (1973) regression and add interaction terms of the option liquidity measures with informed option trading measures to test whether the information content of option trading activities for future stock price movements are related to the level of option liquidity. Our theoretical model provides specific predictions as follows:

$$R_{i,t} = \alpha_t + \left(\gamma_{1t} + \gamma_{2t}\, LIQ_{i,t-1}^{Option}\right) \times IVSKEW_{i,t-1} + \delta_t Controls_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

where $R_{i,t}$ is the return on firm i for week t, $LIQ_{i,t-1}^{Option}$ is the level of option liquidity measure for firm i in week t-1 (AILLIQ, PILLIQ, and DVOL), $IVSKEW_{i,t-1}$ is the implied volatility skew for firm i in week t-1, and $Control_{i,t-1}$ is the control variables for firm i observed at week t-1 including stock liquidity, log firm market capitalization, the previous 1-month stock return, and the underlying return volatility calculated using the previous month's daily return.

Table 5 documents the results for the effect of option liquidity on the predictive ability of IVSKEW for future stock returns. The estimated coefficients on the $IVSKEW_{i,t-1}$ all carry a negative sign and statistical significance, regardless of which liquidity measure is used. The estimated coefficients of the interaction terms $LIQ_{i,t-1}^{Option} \times IVSKEW_{i,t-1}$ have positive and negative signs, and are not significant in the PILLIQ and AILLIQ cases. The estimated coefficient of interaction terms for DVOL is positive and significant. Compared with the impact of stock liquidity on the informational predictability, the empirical results indicate that the underlying stock liquidity plays more important role than the option liquidity in explaining the information transmission between option and stock markets.

Table 5: The Effect of Option Liquidity

Independence Variables	**Models**	
	Coeff.	***t*-stat.**
Panel A: AILLIQ		
Intercept	0.117	1.962**
IVSKEW	-0.077	-3.442**
$LIQ^{Option} \times IVSKEW$	-0.003	-0.616
Controls	Yes	
Adj R^2	20.60%	
Panel B: PILLIQ		
Intercept	0.062	1.072
IVSKEW	-0.092	-3.965**
$LIQ^{Option} \times IVSKEW$	0.005	-0.773
Controls	Yes	
Adj R^2	20.72%	
Panel C: DVOL		
Intercept	0.246	3.725**
IVSKEW	-0.094	-4.473**
$LIQ^{Option} \times IVSKEW$	0.012	1.874*
Controls	Yes	
Adj R^2	20.23%	

*This table reports the results of the Fama-MacBeth (1973) regression. The t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at the 10% and 5% levels.*

Portfolios Sorted on Stock Liquidity and Option Liquidity

In this section, we further examine the interaction effect of stock liquidity level and option liquidity level on informational predictability. For each liquidity measure (AILLIQ, PILLIQ, and DVOL), we constructed a two-way sequential-sort analysis of stock liquidity and option liquidity to examine the option liquidity effect on the predictive ability of options trading for stock returns, controlling for different stock liquidity

levels. We first sort all stocks into two portfolios based on the stock liquidity level at the end of each week, and then into two portfolios with different option liquidity level at the end of each week. For each portfolio, we run the Fama-MacBeth (1973) regression to regress the stock returns on IVSKEW and control variables. Table 6 documents the estimated coefficients on the IVSKEW for each portfolio.

The empirical results show that most of the estimated coefficients of IVSKEW are all negative and significant, especially for the low stock liquidity and high option liquidity groups. For each level of option liquidity groups, the absolute estimated coefficients of IVSKEW are greater for low stock liquidity groups, regardless of which liquidity measure is used. For each stock liquidity portfolio, the absolute estimated coefficients of IVSKEW tend to increase with option liquidity. The empirical results show that negatively predictive relation between option trading activity and stock returns is particular remarkable for stocks with lower liquidity and options with higher liquidity. These results indicate that stock liquidity and its corresponding option liquidity play an important role in explaining the information content of option trading activities for informed traders.

Table 6 Portfolio Sorted on Stock Liquidity and Option Liquidity

	Group 1 (High Option Liquidity)		**Group 2 (Low Option Liquidity)**	
	Coeff.	***t*-stat.**	**Coeff.**	***t*-stat.**
Panel A: AILLIQ				
Portfolio 1 (High Stock Liquidity)	-0.027	-0.80	-0.082	-2.02**
Portfolio 2 (Low Stock Liquidity)	-0.090	-3.10**	-0.157	-3.65**
Panel B: PILLIQ				
Portfolio 1 (High Stock Liquidity)	-0.073	-2.31**	-0.066	-1.58
Portfolio 2 (Low Stock Liquidity)	-0.088	-3.18**	-0.086	-1.92*
Panel C: DVOL				
Portfolio 1 (High Stock Liquidity)	-0.009	-0.24	-0.096	-2.71**
Portfolio 2 (Low Stock Liquidity)	-0.085	-2.80**	-0.061	-1.71*

*This table reports the results of portfolio sorted on the stock liquidity and option liquidity. For each portfolio, we run the Fama-MacBeth (1973) regression to regress the stock returns on IVSKEW and control variables and report the estimated coefficients of IVSKEW. The t-statistics are estimated based on the Newey-West (1987) estimation. * and ** respectively indicate significance at the 10% and 5% levels.*

CONCLUSION

This paper empirically tests whether the information content of option trading activity for future stock price movement is related to stock liquidity level and option liquidity level. The data used for this study consists of daily option and stock records for the component stocks of the S&P 1500 index from the beginning of January 2013 through the end of December 2017. We use the IVSKEW proposed by Xing et al. (2010) to capture informed option trading. An informed trader with positive private information on stock i will take information advantage by buying call options, while buying put options on negative private information about future stock prices. Thus, a higher IVSKEW in individual options would reflect a greater risk of negative price jumps. Three stock and option liquidity measures are investigated: AILLIQ, PILLIQ, and DVOL. This enables us to test the robustness of different liquidity measures.

The empirical results show that there is a negative predictive relationship between option trading activities and future stock returns. The predictability of IVSKEW is particular notable for stocks with lower liquidity, regardless of which liquidity measure is used. The results suggest that stock is slow to incorporate information embedded in option trading activities. In addition, our analysis shows that the predictive ability of option trading activity tends to increase with option liquidity, for each level of stock liquidity. On the

whole, the empirical results show that stock liquidity and option liquidity all are the determinants of the predictive ability of option trading activity for stock returns, regardless of which liquidity measure is used.

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