



Trade duration, informed trading, and option moneyness



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ABSTRACT

This study shows the relationship between the price impact of a trade and the duration between trades by extending a trade indicator microstructure model. Using the intraday transaction data from the KOSPI 200 options market, one of the most famous and actively traded derivatives markets in the world, we find that the price impact is greater when the trade duration is shorter for in-the-money (ITM) options, while the correlation is opposite for out-of-the-money (OTM) options. Our finding that fast trading indicates informed (noisy) trading in the ITM (OTM) options remains unchanged despite controlling for the effects of trade volume, market liquidity, and intraday time periods. There are indications that the different compositions of informed and uninformed traders in terms of option moneyness cause this result. We also find that the information content of trade duration becomes greater when informed trading is more concentrated, liquidity is lower, option maturities are longer, and the market is more volatile.

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1. Introduction

What causes the different behavior of price movements? This paper examines an issue studied by various researchers in the field of financial economics, namely, the possible reasons for the differences in the relationship between the price impacts of trades and the inter-transaction times measured by durations between trades. Dufour and Engle (2000) find that “times when markets are most active are times when there is an increased presence of informed traders,” thus showing that the price impact of a trade decreases with trade duration. While subsequent studies such as those by Chen, Li, and Cai (2008), Furfine (2007), Liu and Maheu (2012), Ryu (2015b), Spierdijk (2004), and Xu, Chen, and Wu (2006) also arrive at the same conclusion, Beltran-Lopez, Grammig, and Menkveld (2012) and Grammig, Theissen, and Wünsche (2011) report that the price impact increases with trade duration.

These contrasting results may be caused by the different approaches/methodologies used by the authors and/or the different datasets employed to incorporate/describe the varying market environments being studied. Our research contributes to the debate

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by proposing that the difference in the degree of information asymmetry may explain these varied results. When it is highly likely that the trading counterparty will be informed, informed traders will not risk submitting orders that can earn profits but have less execution probability; rather, they will submit orders close to the fundamental value. Thus, the price may converge faster and fewer trades may be executed. However, the existence of more noise traders in the market ensures that informed traders can time their trades to maximize their profits. In other words, with less competition among informed traders, and if noise trading activity varies, informed traders can time their orders when there are more noise traders in the market and increase their profits.

This paper relates to the strategic decisions of informed traders depending on the market structure and environment.¹ Our research explains the different correlations between the price impact of a trade and the trade duration in terms of how informed traders change their trading behavior depending on the chances of the trading counterparty being informed.

Motivated by this understanding and the inconsistent results in the previous literature, we hypothesize that the price effects and information roles of trade duration can differ depending on the traits and proportions of investors, or more specifically, the different compositions of informed and uninformed investors participating in the market. In particular, this study examines whether the trade duration plays different roles across options with varying degrees of information asymmetry on the same underlying asset. We posit that the trading environment and degree of informed trading significantly differ across option moneyness.² To test this, we study the KOSPI 200 options market, wherein it is well known that the participation rates and compositions of investors significantly differ by option moneyness. More specifically, the proportion of informed versus that of uninformed investors in out-of-the-money (OTM) options exhibits clear distinct patterns compared to that in in-the-money (ITM) options.

The KOSPI 200 options market provides an ideal setting for analyzing the information content of trade duration because all contracts are traded under the similar trading condition and environment (e.g., the same trading mechanism, underlying asset, and information source).³ More importantly, a strand of empirical studies, including Ahn, Kang, and Ryu (2008, 2010), Guo, Han, and Ryu (2013), Kang and Park (2008), Kim and Ryu (2012), Ryu (2011), Ryu, Kang, and Suh (2015), and Sim, Ryu and Yang (2016), consistently report that individual traders who are primarily utilitarian (or futile traders) account for a large volume in the KOSPI 200 OTM options trading, while foreign institutional investors who are more experienced, and thus better informed, actively trade in the ITM options market.⁴ Thus, this qualitative difference between the OTM and ITM options trading allows us to analyze how the degree of information asymmetry affects the relationship between the price impacts of trades and their durations. In agreement with the reviewed literature, we observe that investor composition differs by option moneyness. Then, we analyze how our results differ by option moneyness after controlling for other considerations of options trading, such as trade volume, market liquidity, and intraday time periods.

We find that the price impact of a trade decreases with trade duration (i.e., fast trading indicates informed trading) for OTM options, whereas it increases with trade duration (i.e., fast trading indicates uninformed and/or noisy trading) for ITM options. Our result may be attributed to the variation in the strategy of informed investors in the market environment. The varied characteristics of OTM and ITM options result in different trading environments, namely, the changing compositions of informed versus uninformed investors. These indicate that, when an investor decides to submit orders, her counterparty can differ by option moneyness. For the OTM options market, where the counterparty is likely to be a noise trader, an informed investor can wait until the market is active to maximize her profit, as in Admati and Pfleiderer (1988). Thus, the information content of a trade is more likely to exist when the market is active. The empirical results are also consistent with those of Easley and O'Hara (1992), who argue that informed traders split their trades, thus leading to frequent trades in the presence of information content. Recently, Collin-Dufresne and Fos (2014) use a variant of Kyle's (1985) model to show that informed traders time their trades when noise trading activity is higher, and thus, more private information gets revealed. Collin-Dufresne and Fos (2015) also provide empirical evidence that activist investors time their trades when market liquidity is higher.

In contrast, for the case of ITM options, it is more probable for the trading counterparty to be an informed trader. In an informational event, any submitted order placed far from the new value of the option is unlikely to be executed. Thus, orders that were already placed may be canceled or revised because of the shift in the fundamental value of the option, and we may observe price discovery with less number of trades executed. Since the price impact of a trade (quote revisions and cancellations are not counted as trades) is measured when the transaction occurs, the time between two consecutive trades may be longer than the times when there are

¹ Lee, Eom, and Park (2013) show that investors spoof more frequently for stocks with higher volatility. Obizhaeva and Wang (2013) find that the optimal trade execution strategy relies on the market's dynamic properties, such as the speed taken by the supply/demand to recover and return to its steady state.

² Prior research suggests that the extent of informed trading varies with option moneyness (Biais & Hillion, 1994). Though the previous studies agree that the option moneyness metric, which determines the degree of leverage effect and the option delta value, explains the cross-sectional distribution of the degree of informed trading, they disagree as to which option moneyness attracts informed trading to a larger extent. Textbook cases and classical studies on developed options markets, including Chakravarty, Gulen, and Mayhew (2004), Lee and Yi (2001), Pan and Poteshman (2006), and Stoll and Whaley (1990), explain that out-of-the-money (OTM) options provide higher leverage effect for options traders; therefore, informed investors attempting to maximize their profits by exploiting this leverage effect prefer investing in OTM options. In contrast, Ahn et al. (2008, 2010), Kim and Ryu (2012), Ryu (2011), Ryu et al. (2015), and Sim, Ryu and Yang (2016) find that the information content of OTM options is quite low in an options market that is highly liquid but with speculative and noisy trading. They find that informed trading is more concentrated on in-the-money (ITM) options in this market and attribute this finding to the relatively high participation rates of experienced investors (e.g., foreign institutions) in ITM options trading. In an experimental setting, De Jong et al. (2006) also argue that ITM options can attract a higher portion of informed trading than other options because ITM options have high delta and sensitivity values, and as a result, they are the most highly related to underlying price changes. Johnson and So (2012) suggest some empirical predictions and conditions where high leverage (i.e., ITM) options have more information content than lower leverage (i.e., OTM) options. Analyzing the dataset of the Chicago Board Options Exchange (CBOE) options market, Kaul et al. (2004) claim that at-the-money (ATM) options, which have relatively higher liquidity and lower transaction costs, provide an optimal environment for informed trading.

³ We provide more details on the KOSPI 200 options market and fully explain why we focus on this index options market in Sections 2 and 3.

⁴ Utilitarian traders trade for non-informational reasons. They obtain benefits besides trading profits from trading. Futile traders believe that they are informed but fail to make trading profits because they have no informational advantages that would make them profitable traders (Harris, 2002). Based on these considerations, we assume that the trading of individuals is orthogonal to information, and thus, it does not vary with informed trading.

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