



## Information-based trading, price impact of trades, and trade autocorrelation

Kee H. Chung <sup>a,\*</sup>, Mingsheng Li <sup>b</sup>, Thomas H. McInish <sup>c</sup>

<sup>a</sup> *Department of Finance and Managerial Economics,  
State University of New York (SUNY) at Buffalo, Buffalo, NY 14260, USA*

<sup>b</sup> *University of Louisiana at Monroe, Monroe, LA 71209, USA*

<sup>c</sup> *University of Memphis, Memphis, TN 38152, USA*

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### Abstract

In this study we show that both the price impact of trades and serial correlation in trade direction are positively and significantly related to the probability of information-based trading (PIN). The positive relation remains significant even after controlling for the effects of stock attributes. Higher trading activity (i.e., shorter intervals between trades) induces both larger price impact and stronger positive serial correlation in trade direction. The effect of time interval between trades on quote revision is stronger for stocks with higher PIN values. These results provide direct empirical support for the information models of trade and quote revision.

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\* Corresponding author. Tel.: +1 716 645 3262; fax: +1 716 645 3823/2131.

*E-mail addresses:* [keechung@buffalo.edu](mailto:keechung@buffalo.edu) (K.H. Chung), [mingli@ulm.edu](mailto:mingli@ulm.edu) (M. Li), [tmcinish@memphis.edu](mailto:tmcinish@memphis.edu) (T.H. McInish).

## 1. Introduction

In this study we address the following questions using trade and quote data: (1) What is the extent to which quote revisions are driven by informational reasons? (2) Does informed traders' strategic trading result in serial correlation in trade direction? (3) How does informed trading influence the effect of trading intensity on quote revision? We address these questions by analyzing the relation between the probability of information-based trading (PIN), the price impact associated with trades, trade direction serial correlation, and time interval between trades.

Market microstructure theory postulates that trades convey information and exert a permanent impact on share price.<sup>1</sup> Theory also predicts that the price impact of a trade is positively related to the extent of information-based trading (see Hasbrouck, 1991a; Easley et al., 1997b). Although prior studies (see Hasbrouck, 1988, 1991b) show that trades trigger quote revisions, there is limited evidence as to whether the observed quote revisions are indeed driven by information motives or some other reasons. For example, the price impact of trades may result mainly from the specialist's inventory control (see Stoll, 1978, 1989).<sup>2</sup> Both the information and inventory models predict that marketmakers raise quotes after buyer-initiated trades and lower quotes after seller-initiated trades.

We differentiate between these theories by examining the relation between quote revisions and PIN. If the relation is primarily driven by inventory control then the price impact of orders should be independent of PIN. Alternatively, if quote revisions are driven, at least in part, by information motives, then we should document a positive relation between PIN and price impacts. Although Hasbrouck (1991a) shows that the price impact of a trade is greater for smaller firms, firm size is likely to be a noisy proxy for information-based trading. Our study offers a more direct and discriminating test of information vs. inventory models of quote revisions using a better measure (i.e., PIN) of information-based trading.

Although numerous studies find positive serial correlation in trade direction, what drives such correlation is not clear. Hasbrouck (1991a) holds that positive serial correlation in trade direction could be attributed to price continuity rules, specialist inventory control, trade reporting practices, and other institutional/market microstructure factors. Chan and Lakonishok (1993, 1995) suggest that institutional investors may spread trades in a single security across time to minimize execution costs,

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<sup>1</sup> How new information is impounded into asset prices in markets with asymmetrically informed agents is one of the intriguing questions in modern financial economics. Major contributors in this area include Bagehot (1971), Copeland and Galai (1983), Glosten and Milgrom (1985), Kyle (1985), Easley and O'Hara (1987), Admati and Pfleiderer (1988), and Seppi (1992).

<sup>2</sup> Marketmakers control their inventories primarily by influencing the buying and selling decisions of their clients. When marketmakers want to decrease (increase) their inventories, they lower (raise) their bid and ask prices.

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