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When is inter-transaction time informative? ☆

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Abstract

This paper estimates the role of inter-transaction time in price discovery for 100 NYSE-listed firms between 1993 and 2003. We find faster arriving trades move prices more than slower arriving trades across stocks and across time. We further document that the information content of inter-transaction time varies with trading activity, and is weakest for the most actively traded stocks. We then distinguish trades in the same direction as the previous trade from trades in the reverse direction. Our empirical findings document that inter-transaction time is informative for both types of trades, but in opposite directions. Faster arriving trades in the same direction are more informative, whereas faster arriving trades in opposite directions are less informative.

JEL classification: G14; G12
Keywords: Price impact; Inter-transaction time; Market microstructure; Information content

Previous research has generally found trades arriving quicker move prices more than trades arriving slower. However, these studies have generally analyzed a relatively small number of stocks or a small time period of trading. In this study, we investigate the role of inter-transaction time in price discovery on a sample of 100 NYSE-listed stocks over the period 1993 to 2003. This large panel dataset allows for a deeper examination of how the information content of inter-transaction time varies across stocks and over time.

We focus on two aspects of inter-transaction time. First, we explore whether the information content of the time between trades is related to the typical trading activity of a given stock. To motivate, suppose a particular stock is traded each 6.5 h day by 250 uninformed traders. If an

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information event occurs, an additional 50 "informed" traders will transact. This implies trades occur approximately every 93 s when there is no information and every 78 s when there is. Suppose this 16% reduction in average inter-transaction time is sufficient to inform a market maker that a new information event has occurred. Now assume "uninformed" trading in another stock is 750 trades per day, but the number of potential informed traders remains at 50.[1] Market makers would then see an average inter-transaction time of 31 s when there is no information and 29 s when there is. Given the variability of inter-transaction times around their mean, it is conceivable that this difference is insufficient to convey information. More generally, as average inter-transaction times fall, one might believe the information conveyed by variation in the time between trades declines. This paper explores whether the information content of inter-transaction time is related to a stock's trading volume.

The second aspect of inter-transaction time on which we focus is whether or not the direction of trading relates to the information content of the time between trades. A number of fast-arriving buy orders may convey a significant probability of an information event suggesting a need for a higher price. Fast-arriving trades that are both orders to sell and orders to buy, however, need not convey anything more than a large presence of liquidity traders. Thus, the information contained in fast arrival may vary according to whether trades are of the same type (e.g. all buy orders) or of different type (e.g. a mixture of buys and sells).

We document the following results new to the microstructure literature. First, we find the information content of inter-transaction time is negatively related to a stock's average trading intensity. This is consistent with the hypothesis that rapid rates of typical trade arrival mask the information contained in the variation of these arrival rates. Second, we find the information content of inter-transaction time depends on whether a trade is in the same direction as the previous trade or in the reverse direction. In particular, fast arrival moves prices more for same-direction trades but less for reverse-direction trades. This is consistent with similar-direction trades having a greater likelihood of signaling an information event.

The paper is organized as follows. Section 1 reviews the microstructure literature related to the information content of the time between trades. Section 2 describes the data used in the study. Section 3 reviews the Dufour and Engle (2000) model of price discovery implemented in the paper. Section 4 presents empirical results for Disney stock (ticker DIS), which is illustrative for the remainder of the paper. Section 5 presents results from the full sample of 100 NYSE-listed companies and documents the relationship between typical trading activity and the information content of inter-transaction time. Section 6 documents the significance of trade direction. Section 7 concludes.

1. Related literature

The time between trades falls as the number of trades increases. Thus, the information content of fast trade arrival depends on whether the increase in the number of trades reflects the arrival of predominantly uninformed investors, as modeled by Admati and Pfleiderer (1988), or informed investors, analyzed by Easley and O'Hara (1992). Moreover, the likelihood of informed trade arrival may relate to the average trading volume of a particular stock (Easley et al., 1996) or whether informed traders wish to buy or sell (Diamond and Verrecchia, 1987).

Empirical tests of the above theories have discovered the relationship between inter-transaction time and price impact depends on the market being examined. In foreign exchange markets, Lyons

[1] Evidence of this relative frequency of "uninformed" traders is supported by Easley et al. (2001).