Information Technology and Quantitative Management (ITQM2013)

Trade Duration and Liquidity of Chinese Stock Market

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Abstract

This paper investigates the relationship between trade duration and liquidity of Chinese stock market. Using data of ten stocks, we employ a Weibull ACD model to decompose trade duration into two components: the expected and the unexpected duration. Then we analyze whether trade duration affects liquidity with regressions. We find that there exists a strong dependence between consecutive durations especially for liquid stocks. Both the expected and unexpected duration could explain the variation of bid-ask spread but the evidence is mixed in the depth equation. The unexpected duration contributes more to the change in liquidity than the expected duration.

Keywords: trade duration; liquidity; spread; depth; autoregressive conditional duration model; WACD model;

1. Introduction

The relationship between trading activity and liquidity has drawn lots of attentions. Easley and O'Hara [1] prove that trades convey information which causes price changes and liqudity variations. Biais et al. [2] study the interaction between the order book and order flow. Using data from a pure limit order market, the Paris Bourse, they analyze the supply and demand of liquidity, they find that after large sales (purchases), there is often a new sell (buy) order placed within the quotes to provide liquidity. Chordia et al. [3] investigate the aggregate market spreads, depths and trading activities for U.S. equities. They find a secular downtrend spread and an upward trend depth and trading volume. They also note strong day-of-the-week effects that Friday accompanies a significant decrease in trading activity and liquidity. Hendershott et al. [4] provide the first analysis on whether algorithmic (AT) trading increase market liquidity. They find AT narrows spreads, reduces adverse selection, and reduces trade-related price discovery for NYSE stocks, particular the larger stocks,

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indicating that AT improves liquidity. Chordia et al. [5] document positive feedback exists between liquidity and trading activity.

However, the relationship between trade duration and liquidity has not been explored by previous studies. In this paper, we try to investigate the relationship with high frequency data. We decompose the trade duration into two components with a Weibull autoregressive conditional duration (WACD) model. Using quoted bid-ask spread and depth as liquidity proxies, we propose two regressions to analyze how duration changes spread and depth. Unlike previous literatures, the decomposition of trade duration in this paper allows us to study the information contained in expected and unexpected duration and their role in affecting liquidity.

The paper is organized as follows: section II describes our liquidity measures and data. Section III introduces the autoregressive conditional duration model and its extension model. Section IV presents the estimation results of trade durations, we also analyze their effects on stock liquidity in this section. Section V concludes.

2. Liquidity measures and data

Chinese stock market is organized as a fully automated, pure order-driven market. It consists of two stock exchanges: the Shanghai exchange and the Shenzhen exchange. Both stock exchanges are open five days a week from 9:30 a.m. to 3 p.m. with a trading break from 11:30 a.m. to 1:00 p.m. daily. Every trading day there is a pre-trading call auction period from 9:15 to 9:25 before continuous auction trading. During the continuous trading session, orders are submitted, modified or cancelled. A trade takes place whenever a counterpart order hits the quotes. The exchange automatically matches all the orders according to strict price and time priority, however, an order may lose priority if modified. Stocks are quoted in RMBs. The minimum price variation (tick) equals 0.01. The minimum trade size is 100 shares. The daily price limit is 10 percent of the previous day's closing price. Chan et al. [6] documents that such price limit mechanisms are employed in many stock exchanges around the world, including Austria, Belgium, France, Italy, Japan and Korea.

There are two share types in China, A shares and B shares. An issuing firm can have one, or both share types. A shares and B shares' main investors are quite different. Until early 2001, B shares were restricted to foreign investors, typically foreign institutions; A shares were restricted to domestic investors. A shares became available to selected foreign investors in 2005.

The A shares are considered to represent the Chinese stock market for the A shares clearly dominate the market in every aspects such as: number of shares issued, market capitalization, and trading activity. In this paper, we only study the relationship of duration and liquidity of the A shares stocks.

2.1. Liquidity measures

It is widely recognized that the concept of market liquidity cannot be captured by a single measure. Kyle [7] identifies three main dimensions of liquidity: tightness, depth and resiliency. Tightness refers to the narrowness of the bid-ask spread which is often measured by the quote-based bid-ask spread, it symbols the transaction costs for traders. Depth, often measured by the quoted depth, is the market's ability to absorb and execute large orders with minimal price impact; Resiliency is the "the speed with which prices recover from a random, uninformative shock".

Amihud and Mendelson [8] prove that there is evidence that bid-ask spread has some relevance with asset pricing. Engle and Lange [9] realize the importance of depth, they propose a new intraday measure of market depth. Easley et al. [10] highlight the importance of both bid-ask spread and depth. The resiliency dimension of liquidity is difficult to measure accurately. Large [11] measures the resiliency by viewing orders and cancellations as a mutually-exciting ten-variate Hawkes point process. There are alternative ways to derive liquidity measures from daily, monthly or even annual return and volume data, Goyenko et al. [12] provide a