The Quarterly Review of Economics and Finance 56 (2015) 139–153

Contents lists available at ScienceDirect

The Quarterly Review of Economics and Finance

journal homepage: www.elsevier.com/locate/qref

Price dynamics and market liquidity: An intraday event study on Euronext

Paolo Mazza*

IÉSEG School of Management, France

ARTICLE INFO

Article history:
Received 18 March 2014
Received in revised form
10 September 2014
Accepted 22 September 2014
Available online 7 October 2014

JEL classification:
G14
G10

Keywords:
Liquidity
Limit order market
Informed trading
Market microstructure
HLOC dynamics

ABSTRACT

In this paper, we determine whether intraday price dynamics observed on Euronext help characterize market liquidity in real time. We generate 15-min price movement configurations based on high-low-open-close (HLOC) patterns and measure liquidity in terms of spread, depth, order imbalance, dispersion and slope. We also consider trading activity and volatility measures. Based on an event study methodology, we find that particular HLOC configurations are associated with higher liquidity in the limit order book. Although these effects are short-lived, market participants could benefit from temporary higher liquidity by executing their trades when these price configurations occur.

1. Introduction

Liquidity has become of utmost importance in finance. The liquidity black holes observed during the subprime crisis, the recent emergence of liquidity dark pools, and the surge in high frequency trading have drawn the attention of an increasing number of researchers and practitioners. The flash crash of May 6th, 2010 has shown in particular that liquidity can be very unstable through time. In such a trading environment, the ability to find and estimate intraday liquidity in a fast and accurate way is extremely precious but also very challenging. Liquidity is indeed not unidimensional. Harris (2003) defines liquidity as "*the ability to trade large size quickly, at low cost, when you want to trade*"[1] and attributes three main dimensions to liquidity (i.e. immediacy, width and, depth), before identifying resiliency as the fourth dimension. In this paper, we study intraday price dynamics observed on Euronext in order to determine whether they help better characterize market liquidity as a whole in real time, which in turn could help reduce transaction costs. Price dynamics present the advantage to be widely available and easily depicted in charts. Therefore, such a relationship would allow market members to have a quick snapshot on the state of liquidity without processing the information contained in the limit order book. Furthermore, this would present the advantage of circumventing the new limitations of open limit order books, such as a low order-to-trade ratio and a high number of order cancellations. Even if existing literature elements have analyzed the performance of liquidity proxies, such as Aitken and Comerton-Forde (2003) and Goyenko, Holden, and Trzcinka (2009), the attention of researchers has been but rarely drawn on the importance of price dynamics for this purpose.

An exception to this fact has been provided by Kavajecz and Odders-White (2004) who first reveal some unexpected features of price dynamics with respect to liquidity on the NYSE. These authors study the information content of technical analysis for liquidity provision. They do not investigate the return predictability power of technical indicators but examine similarities between support and resistance levels and the level of depth in the limit order book. They also study moving average indicators and assess their information content in the order book. Their results show that signals in price charts are significantly related to the state of liquidity in the order book. They find that support and resistance levels and moving averages are strongly correlated with liquidity. The authors also

* Correspondence to: IÉSEG School of Management, 3 Rue de la Digue, 59000 Lille, France. Tel.: +33 03 20 54 58 92.
E-mail address: p.mazza@ieseg.fr

[1] Harris (2003), pp. 394.

http://dx.doi.org/10.1016/j.qref.2014.09.003

conduct Granger causality tests which reveal that technical analysis helps discover depth available in the book. However, their study has several limitations. Firstly, the four liquidity measures they define are customized proxies that are not easily extracted from the limit order book. Secondly, they focus on 30-min intervals only, without trying to extend their results to longer and shorter time frames. Thirdly, as support and resistance levels are often related to round price limits, the relationship they outline between technical analysis and liquidity may just be due to limit order clustering at these round prices, implying a higher depth for round price limits.[2] Fourthly, price dynamics in their study are captured by changes in closing prices only.

To respond to each of these limitations, we significantly contribute to the existing literature by focusing on high-low-open-close (HLOC) price dynamics. Intraday HLOC prices provide market participants with a quick snapshot of buying and selling pressures, as well as turning points. As such, they might help estimate intraday liquidity in a fast and accurate way. Using market data on a sample of European stocks, we study the relationship between liquidity and price movements by applying an event study methodology on 15-min intervals for several HLOC patterns. As outlined by Kavajecz and Odders-White (2004), price dynamics are expected to be related to modifications in the state of the limit order book and to the supply of liquidity. For this purpose, we analyze various standard liquidity proxies: relative spread, one-sided displayed and hidden depth (at the best bid and offer and at the five best limits), order imbalance, dispersion, and slope. We also analyze the following trading activity measures: number of buyer and seller-initiated trades, as well as trade imbalances.

Our empirical analyzes suggest that HLOC price movements characterizing a consensus on the value of a security are shown to contain important information regarding liquidity. Bloomfield, O'Hara, and Saar (2005) propose theoretical evidence suggesting that informed traders supply more liquidity when they evaluate that the fundamental value of the security is inside the best quotes, resulting in a consensus price. For all liquidity proxies, our results suggest that liquidity is higher when such a consensus HLOC price configuration appears on screen. There is nevertheless less trading activity at that particular time. This reinforces the hypothesis of price agreement for the security and is consistent with limit order book models and empirical evidence, as indicated by Chakravarty and Holden (1995) and Foucault (1999). This consensus implies a narrower spread, higher depth and less dispersion due to higher competition that liquidity suppliers face. The duration of the liquidity changes depends on the proxy, but the patterns are typically short-lived. The position of opening and closing prices on the high-low range is also related to different changes on bid and ask sides: prices close to the highest point of the interval are linked to changes at the ask while prices near the lowest point are related to changes at the bid.

We investigate whether these results are related to the probability of informed trading. Based on the PIN measure proposed by Easley, Kiefer, O'Hara, and Paperman (1996), our analysis shows that consensus HLOC price configurations characterize moments at which the PIN is lower, indicating that informed traders are less likely to generate trade imbalances. We also conduct Granger causality tests in order to address the direction of the relationship between HLOC price movements and liquidity. Our results indicate that changes in liquidity proxies 'Granger cause' changes in the close-open range and that price movements are good indicators for liquidity. As robustness checks, we extend our analysis to other types of configurations. We also check the significance of our results when we consider 30-min and 60-min intervals. We find similar but less significant results indicating that the relationship is rather short-lived.

All in all, our analysis indicates that HLOC dynamics may be used to quickly characterize the four dimensions of liquidity in a single chart. Since information displayed in the limit order book is often difficult to interpret in real time, when available, the quick estimation of liquidity through HLOC price dynamics may bring significant improvements in the execution of buy and sell decisions taken by investors, portfolio managers and brokers.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the literature on price dynamics and liquidity. We give theoretical evidence on the links between liquidity and the consensus HLOC price configurations. Section 3 describes the dataset and the different liquidity measures that are used. Section 4 presents the methodology that we apply. Section 5 reports the findings of the event study, Section 6 presents the results of the PIN analysis and, Section 7 is devoted to a causality analysis. Section 8 contains the robustness checks that are performed. Section 9 concludes.

2. Literature review

2.1. Price dynamics

HLOC price dynamics may easily be represented in charts where each interval is related to a configuration similar to the one depicted in Fig. 1. These HLOC movements emphasize what happened in the market at that particular moment. Each configuration can be translated into traders' behaviours through price dynamics implied by buying and selling pressures.

This type of representation is interesting because it summarizes a lot of information in one single chart: the closing price, the opening price as well as the lowest and highest prices. With the raising interest in high frequency trading and the narrowing of trading intervals, they have been increasingly used to capture short term price dynamics and are available in almost all trading softwares. Previous research has also outlined strong relationships between price movements and trade measures (Blume, Mackinlay, & Terker, 1989). We expect a relationship between the occurrence

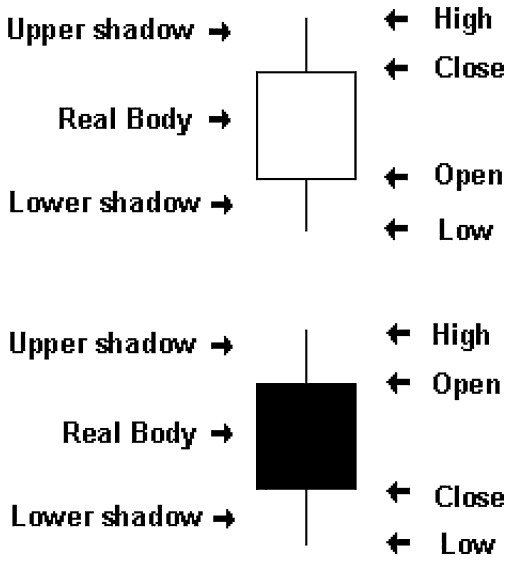

Fig. 1. HLOC dynamics in charts.

[2] There is an extensive literature on round prices that we do not discuss in the paper. Ball, Torous, and Tschoegl (1985), Harris (1991) and Kandel, Sarig, and Wohl (2001) are some examples.