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Arbitrage opportunities and liquidity: An intraday event study on cross-listed stocks

Imen Ghadhab

Faculty of Science Economics and Management of Tunis (FSEG Tunis), University of Tunis El Manar, Tunisia

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ABSTRACT

The aim of this study is to investigate intraday liquidity patterns around the occurrence of an arbitrage opportunity in markets for cross-listed stocks. By implementing an event study on high frequency intraday data, we find that liquidity is higher when an arbitrage opportunity event occurs. The Granger causality test show unidirectional and even bidirectional causation between price movement and liquidity measures indicating that price discrepancy may be a result of a particular state of liquidity. We also find that informed trading is higher when arbitrage opportunity occurs and even increases when the number of events increases during the day.

1. Introduction

Since the 1980, the world's capital markets have been hugely influenced by globalization. The growth in international integration among world capital markets was mainly explained by the decision made by companies to cross-list their shares in overseas market. Since prices of cross-listed stocks are the prices of the same security, a higher degree of financial integration is expected to improve market efficiency and ensure price equality. Even if prices diverge, such discrepancy must be eliminated by arbitrage activities that bring prices toward equilibrium. As such, this has attracted the interest of researchers to test if arbitrage opportunities between markets for cross-listed stocks exist (Suarez, 2005; Gagnon and Karolyi, 2010; Alsayed and McGroarty, 2012; Ansotegui et al., 2013; Ghadhab and Hellara, 2015)

Against this background, we analyze arbitrage opportunities between markets for cross-listed stocks from a new perspective and therefore contribute to the existing literature as follow. In fact, we investigate the dynamic of price deviations, and more particularly arbitrage opportunities, observed on markets for cross-listed stocks in order to determine whether they help better characterize stock liquidity patterns in real time, which in turn could help reduce transaction costs. Such a relationship would allows investors to have a quick overview on the liquidity patterns without processing the information contained in financial markets since arbitrage opportunities can be easily determined and observed in data and charts. Even

E-mail address: ghadhabimen@yahoo.fr

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if existing literature has analyzed intraday liquidity patterns for cross-listed stocks,[1] the attention of researchers hasn't been drawn on the importance of arbitrage opportunities for this purpose.

Our motivation to investigate the relationship between arbitrage opportunities and liquidity for cross-listed stocks is that several earlier empirical and theoretical studies have shown a significant relationship that exists between price movement and liquidity (Biais et al., 1995; Chordia et al., 2001, 2008; Chan et al., 2013). Moreover, liquidity is 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 substantial number of researchers and practitioners. 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.

To respond to our paper's object, we significantly contribute to the existing literature by focusing on high frequency arbitrage opportunities dynamics. Intraday arbitrage opportunities provide market participants with a quick snapshot of buying and selling pressures, as well as turning points. Therefore, they might help estimate intraday liquidity in a fast and accurate way. Using high frequency intraday stock prices on a sample of European and Canadian firms cross-listed in the US, we study the relationship between intraday liquidity and price movements by applying an event study methodology on 15-minute intervals ((−15,+15)) for both local and foreign cross-listing markets. We analyze various standard liquidity proxies: volume, turnover, depth, absolute spread and relative spread. We show that liquidity is higher when arbitrage opportunities appear in markets for cross-listed stocks. This event (arbitrage opportunity) implies a narrower spread and higher volume, turnover and depth. Our results are robust to the change of the time interval. We find the same results for a 20 and 30-min. intervals but at a lower significance indicating that the relationship between the arbitrage event and liquidity is short-lived. We also observe, in several cases, higher liquidity before the occurring of the event leading us to argue that price discrepancy of cross-listed stocks may be a response of a particular state of liquidity. We therefore conduct Granger causality test in order to address the direction of the relationship between price movements, or arbitrage event, and liquidity. We show unidirectional causation from the event to volume related liquidity measures, or from these later to the event. A bidirectional causality between the spreads' measures and price movement variable was also found. By investigating if these results are related to the probability of informed trading, we show that the occurrence of arbitrage opportunities characterize moments at which the price impact is higher. At the time of price discovery, informed traders should not actively trade and wait for noise and liquidity traders. However, they can place orders to take profit from their informational advantage. These informed traders' transactions generate high liquidity, and therefore a significant price movement that may induce prices of cross-listed stocks to diverge.

This article is organized as follows. We review the literature on Section II. Data and methodology description is put forth in section III. The empirical results are presented in Section IV, and finally, conclusions are drawn in section V.

2. Literature review

Several theoretical and empirical evidences show strong relationships between price movements and liquidity. For instance, Blume et al. (1989) study the interactions between liquidity and price dynamics by investigating the impact of order imbalances on stock price movements during the stock market crisis of October 19 and 20, 1987. The authors show strong correlation between order imbalances and price movements. Biais et al. (1995) investigate the interaction between order book and order flow. They find that investors quickly place orders inside the quotes when the depth at the quotes is large or when the spread is large in order to gain price and time priority. The authors also show that a downward (upward) shifts in the bid and ask quotes is observed after large sales (purchases). By studying aggregate market spreads, depths, and trading activity for U.S. equities, Chordia et al. (2001) empirically find that liquidity and trading activity are affected by market returns and volatility. They also find that effective and quoted spreads increase dramatically in down markets. Within a theoretical framework for Chordia et al. (2001); Chordia and Subrahmanyam (2004) present and obtain the same results at the individual stock level. Chordia et al. (2002) reach the same results and identify a significant impact of daily order imbalance on both market volatility and returns. Harris and Panchapagesan (2005) examine whether the limit order book is informative about future price changes. By using the TORQ database, the authors show a relationship between the limit order book and future price movements. By examining the relations between the state of the limit-order book and previous price movements, Chan (2005) show that at traders are more aggressive in buying and more patient in selling after previous positive stock returns. The authors also find that traders are less aggressive when spreads are large. Chordia et al. (2008) find that short-term return predictability is lower when bid-ask spreads are narrower, or when liquidity is higher. The variance ratio tests show that prices were closer to random walk in the more liquid decimal regime, supporting the fact that liquidity stimulates arbitrage activity, which, in turn, enhances market efficiency. Cao et al. (2009) use a sample of 100

[1] For example, Chan et al (1996) show that foreign stocks cross-listed in the US experience higher trading volumes than similar US stocks, particularly in the early mornings. Werner and Kleidon (1996), Forster and George (1995) and Menkveld (2008) report a significant increase in return volatility of cross-listed stocks in the overlapping trading hours between the home and the host markets and show that this increase in volatility is related to the level of trading activity. Another group of researchers investigate the effect of cross-listing on stocks' liquidity and the general finding is that cross-listing is accompanied by a substantial increase in liquidity, in terms of spread and depth, around the cross-listing event. (See for example: Smith and Sofianos, 1997; Forester and Karolyi, 1993; Bacidore et al., 2005; Halling et al., 2008; Moulton and Wei, 2009)

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