Int. Fin. Markets, Inst. and Money 27 (2013) 202–223

Contents lists available at ScienceDirect

Journal of International Financial Markets, Institutions & Money

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

An international trend in market design: Endogenous effects of limit order book transparency on volatility, spreads, depth and volume[☆]

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ARTICLE INFO

Article history:
Received 8 February 2013
Accepted 23 September 2013
Available online 8 October 2013

JEL classification:
G10
G15
G18

Keywords:
Market quality
Limit order book
Transparency

ABSTRACT

Following other leading international securities markets, the Tokyo Stock Exchange (TSE) has adopted a publicly displayed but anonymous limit order book, and we ask: how is market quality affected? Accounting for fixed effects and endogeneity, we find increased volatility and higher order book depth at the best bid and ask prices, while total depth is not significantly impacted. This predicts more competitive order strategies in a trading system with anonymous orders but with more visible price levels. Spreads are found to be unaffected by the market design change, in contradiction to previous literature. Complementing the literature, we find volume increases, indicating that the aggregate effect of the design change is positive.

☆ We wish to thank the Security Industry Research Centre of Asia-Pacific (SIRCA), the Faculty of Business, University of Tasmania and the Australian Research Council (ARC) for data and financial support. We are grateful to the Tokyo Stock Exchange for providing us with information about the stock exchange, and thank Mardi Dungey, Paresh Narayan, Peter Swan and Joakim Westerlund for valuable comments and detailed suggestions. We would also like to thank participants at the 27th International Conference of the American Committee for Asian Economic Studies (ACAES) and at the 3rd Annual Conference on Asia-Pacific Financial Markets for constructive comments.

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http://dx.doi.org/10.1016/j.intfin.2013.09.006

1. Introduction

A recent trend in international securities markets has been to cease disclosing pre-trade broker identification and at the same time increase the visibility of the now anonymous order book.[2] This paper investigates the impact of this common change in pre-trade transparency on market quality. This is an important question as the change in pre-trade transparency may affect market quality in several ways. Anonymous trader identities may potentially have negative effects as the search for counterparties becomes more costly. The ability for brokers perceived as informed to remain anonymous may again have positive effects. A greater transparency of the depth of the order book is expected to have positive effect, as trades can be executed with greater accuracy when the exact volume on several price levels is known. In this paper we measure market quality as volatility, bid-ask spreads, limit order book depth and volume as we investigate the Tokyo Stock Exchange (TSE), the second largest stock market in the world by market capitalization and fourth by traded value up to 2009.[3] The TSE ceased to display broker identity to exchange members in June 2003, and simultaneously increased the level of limit order book information by providing the three best bid- and ask-price levels and volumes to the public. This provides us with an excellent opportunity to study the impact on market quality of a common change in market design, and to do so using data from a highly significant stock market that also represents a pure limit order book market rather than a hybrid of dealer- and order-driven markets. The studied change in market design is common for limit order book markets, while hybrid markets tend to provide some transparency of dealer identity. Although we recognize that the market design change investigated in this paper is complex, it is the design of choice for most limit order markets, and hence it is important to provide a more complete picture of the impact of such a common design change. In one previous study, where the 2003 market design change at TSE is included, Comerton-Forde et al. (2005) focus on the impact on spreads, which does not provide a complete picture of the impact of the market design change studied here. In addition, we contribute to the literature by addressing the endogeneity problem of previous empirical research that typically examines one statistic for market quality and uses several others as exogenous controls.[4]

We use several alternative metrics for market quality, and methodology that accounts for fixed effects and endogeneity in the included statistics for market quality. We find that volatility increases after the TSE market design change. The depth of the limit order book increases at the best bid and ask prices while total depth is not significantly impacted. Accounting for the interaction between spreads, volatility and volume, we find that spreads are not affected by the design change. Previous literature does not consider the volume effects of transparency. In our paper, we find that volume increases as a result of the TSE design change, which is consistent with the higher volatility.

[2] Rindi (2008) points out that almost all the asset markets organized as electronic platforms are anonymous: NYSE's Open Book service shows the aggregate limit-order volume available in the NYSE Display Book system at each price point, but provides no identity of the participants behind these orders. The single platform for NASDAQ-listed securities (NASDAQ's Integrated Single Book), into which the NASDAQ Market Center, Inet and Brut recently merged, is anonymous; all European trading platforms are anonymous, as well as all electronic communication networks and foreign exchange electronic markets (e.g., Electronic Broking System). The Nordic markets have a more complex history. On June 2nd, 2008, NASDAQ OMX Nordic introduced post-trade anonymity on the Helsinki market and the five most heavily traded shares in Stockholm, but in April 2009 the decision regarding Stockholm was reversed and ex-post transparency restored to all but the five largest Helsinki stocks that remain anonymous in real time. Broker identities are revealed at the close of trading. Anonymity was instituted in the Italian secondary market for treasury bonds (MTS) in 1997, in Euronext Paris in 2001, in Tokyo in 2003, in the Italian Stock Exchange (Borsa Italiana) in 2004 and in the Australian Stock Exchange (ASX) in 2005. The Sao Paulo Stock Exchange in Brazil, which provides pre-trade transparency, and the KRX in South Korea, which provides post-trade transparency, are the only markets bucking this trend.

[3] Surpassed in market capitalisation by London SE Group in 2009 and Nasdaq OMX in 2010 (NYSE Euronext remaining largest) and surpassed by Shanghai SE in traded value in 2007 (source World Federation of Stock Exchanges).

[4] Some empirical work investigating the impact of transparency/opacity alteration begins by pointing out that the change alters trade volume and a variety of measures of volatility, effective and realized spread, depending on which variable the authors treat as the dependent variable. However, typically they treat the remaining market quality metrics as exogenous control variables with no attempt to construct instrumental variables or the use of Two Stage Least Squares. There is one notable exception in Eom et al. (2007), which examines the impact of expansions of the best bid and ask levels revealed to the public.