ELSEVIER

Journal of Empirical Finance 9 (2002) 399–430

Journal of EMPIRICAL FINANCE

www.elsevier.com/locate/econbase

The components of the bid–ask spread in a limit-order market: evidence from the Tokyo Stock Exchange

Hee-Joon Ahn [a], Jun Cai [b], Yasushi Hamao [c,*], Richard Y.K. Ho [d]

[a] *College of Economics and Commerce, Sookmyung Women's University, Seoul, South Korea*
[b] *Department of Economics and Finance, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China*
[c] *Department of Finance and Business Economics, Marshall School of Business, University of Southern California, Los Angeles, CA 90089-1427, USA*
[d] *Department of Economics and Finance, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China*

Abstract

This paper analyzes the components of the bid–ask spread in the limit-order book of the Tokyo Stock Exchange (TSE). While the behavior of spread components in U.S. markets has been extensively studied, little is known about the spread components in a pure limit-order market. We find that both the adverse selection and order handling cost components of the TSE exhibit U-shape patterns independently, in contrast to the findings of Madhavan et al. [Rev. Financ. Stud. 10 (1997) 1035] for U.S. stocks. On the TSE, there does not exist an upstairs market that allows large trades to be prenegotiated or certified as on the New York Stock Exchange (NYSE). This feature of the TSE provides a valuable opportunity to examine the relationship between trade size and spread components. Our results show that the adverse selection cost increases with trade size while order handling cost decreases with it.

JEL classification: C14; G15
Keywords: Bid–ask spread; Adverse selection cost; Order-processing cost; Trade size

1. Introduction

Over the past years, limit-order trading has received growing attention as more exchanges implement electronic public limit-order books and open up the market-making

* Corresponding author. Tel.: +1-213-740-0822; fax: +1-213-740-6650.
E-mail address: hamao@usc.edu (Y. Hamao).

0927-5398/02/$ - see front matter
PII: S0927-5398(02)00003-8

process. A number of studies have examined various aspects of the limit-order market. In particular, Glosten (1994), Handa and Schwartz (1996), Rock (in press), Seppi (1997), Viswanathan and Wang (1998), and Foucault (1999) offer a variety of equilibrium models on limit-order trading.[1] Biais et al. (1995) offer an empirical analysis of the supply and demand of liquidity and interaction between the order book and order flow in the Paris Bourse. Harris and Hasbrouck (1996) investigate the relative importance of market and limit orders. Ahn et al. (2001) analyze the interaction between transitory volatility and order flow composition in a limit-order market. Chung et al. (1999) and Kavajecz (1999) examine whether quoted spreads reflect the trading interest of specialists or limit-order traders.[2]

The purpose of this paper is to examine the components of the bid–ask spread in a limit-order market. Existing market microstructure theories on the components of the bid–ask spread are largely developed within the framework of quote-driven single (multiple) dealer markets. In addition to the order-processing costs, the bid–ask spread must cover the following two components: the inventory and information costs in a dealer market.[3] However, the bid–ask spread is not unique to the dealer markets. Cohen et al. (1981) establish the existence of the bid–ask spread in a limit-order market when investors face transaction costs of assessing information, monitoring market, and conveying orders to the market. Glosten (1994) shows that the limit-order market will have a positive bid–ask spread arising from the possibility of trading on private information. Nevertheless, empirical evidence on the bid–ask component in a limit-order market has been extremely limited.[4]

We examine the bid–ask component in a limit-order book of the Tokyo Stock Exchange (TSE). On the TSE, there are no designated market makers with an obligation to take positions in the market. Every transaction is executed by a *saitori* who maintains each offer to buy or sell in an order book, which is open to all exchange members on the floor. All liquidity is supplied by traders who submit limit or market orders. In this sense, the TSE may be better described as a market where a multiple number of dealers provide market-making at their own discretion (Takagi, 1993).

A number of earlier papers explored various aspects of the TSE. Amihud and Mendelson (1989, 1991, 1993) examine liquidity provision and price discovery on the TSE. Hamao (1992) and Takagi (1993) present an overview of the institutional features of the TSE trading. Lindsey and Schaede (1990) compare the role of a *saitori* with that of the specialist of the New York Stock Exchange (NYSE). George and Hwang (1995) and Kim and Rhee (1997) investigate the effectiveness of the TSE price limit rules. Two recent studies examine the intertemporal behavior of the market microstructure on the TSE.

[1] See Seppi (1997) for a more detailed summary of other equilibrium models of limit-order market.

[2] Other empirical studies of limit-order market include Frino and McCorry (1995) and Hollifield et al. (1999).

[3] Demsetz (1968) and Tinic (1972) identify the order-processing costs incurred by the providers of market liquidity. Stoll (1978), Ho and Stoll (1983), and Amihud and Mendelson (1980), emphasize the inventory holding costs. Copeland and Galai (1983), Easley and O'Hara (1987), and Glosten and Milgrom (1985) concentrate on the information costs faced by liquidity suppliers when trading with informed traders.

[4] Brockman and Chung (1999) and Chan (2000) study the bid–ask components on the Stock Exchange of Hong Kong. De Jong et al. (1996) examine the bid–ask component on the Paris Bourse.