

# Limit orders and the intraday behavior of market liquidity: Evidence from the Toronto stock exchange <sup>☆</sup>

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## Abstract

This paper examines the intraday behavior of market liquidity on the TSE. It shows that spread follows U-shaped intraday pattern, depth displays opposite pattern, while volume is low at the open, stable during the day and increases at the close. The paper finds evidence that spread and depth are negatively correlated, suggesting that limit-order traders actively manage both price and quantity dimensions of liquidity to protect themselves from informed trades. Furthermore, it finds that there is price improvement on the TSE. Finally, it shows that liquidity is inversely related to volatility but directly related to volume.

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## 1. Introduction

Major stock markets in the United States, such as the New York Stock Exchange (NYSE), the National Association of Securities Dealers Automated Quotation System (Nasdaq), and the American Stock Exchange (AMEX), employ a hybrid trading system in which both market makers (specialists and dealers) and limit order traders play a pivotal role in providing liquidity to the market. However, the trading systems with market makers are not quite popular outside the United States. Indeed, [Ahn and Cheung \(1999\)](#) document that among the top 37 stock markets

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outside the U.S. only three exchanges employ the trading systems with market makers. The rest operate under the pure order-driven mechanism in which all liquidity is provided by limit-order traders alone. Even in markets with a market-maker trading system, the reliance on the market makers for liquidity has been diminished due, in part, to the introduction of various computerized trading systems that automatically match buy and sell orders.

Although the pure order-driven trading system is used in the majority of markets in the world, researchers have mainly focused on hybrid markets, namely, the NYSE and Nasdaq, because they are major stock markets both in the U.S. and in the world. Only a few studies in the market microstructure literature have so far empirically investigated the pure order-driven trading system and relatively little is known about this market microstructure<sup>1</sup>. This paper intends to bridge this gap by conducting an empirical analysis on the Toronto Stock Exchange (TSE), an order-driven stock exchange. More specifically, I attempt to examine the intraday behavior of the market liquidity on the TSE to see if it has similar intraday patterns observed in other markets such as the NYSE or Nasdaq. The TSE is chosen for the analysis because it provides an ideal setting to examine the behavior of limit order traders. For instance, the market entirely relies on limit orders for liquidity, and it is so transparent that traders can use detailed information in the limit-order book to formulate their trading strategy.

Limit orders play a very important role in providing liquidity to the world stock markets of various market architectures. In an order-driven market, such as the TSE, the Paris Bourse, or the Tokyo Stock Exchange, limit orders provide all liquidity to the market. In a hybrid specialist market, such as the NYSE, a large amount of liquidity comes from limit orders<sup>2</sup>. Even in a dealer market, such as Nasdaq, limit order trading is also allowed.

In a pure order-driven market, investors can submit limit orders or market orders. Limit orders are kept in a limit-order book, waiting for execution. The advantage of limit order is that traders can control the price at which the order might be executed. However, there is risk associated with it. First, a limit order might not be executed. Second, as limit price is fixed, there is adverse selection risk due to the arrival of informed traders<sup>3</sup>. Market orders, on the other hand, are executed with certainty. However, traders have no control over price.

Glosten (1994) examines an equilibrium model in which there are two types of traders. The patient traders place limit orders and therefore supply liquidity to the market. The urgent traders, on the other hand, place market orders and consume liquidity. Informed traders are more likely to be urgent than patient because they want to exploit their superior information<sup>4</sup>. Glosten shows that patient traders would not place limit orders unless the expected gains from trading with liquidity traders exceeded the expected loss from trading with informed traders. However, his model does not endogenize the traders' choice between market order and limit order. Handa and Schwartz (1996) extend Glosten's analysis by examining the investors' rational choice between

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<sup>1</sup> Niemeyer and Sandas (1993) study the Stockholm Stock Exchange, Biais, Hillion, and Spatt (1995) study the Paris Bourse, Hedvall, Niemeyer, and Rosenqvist (1997) study the Finnish Stock Exchange, Hamao and Hasbrouck (1995) study the Tokyo Stock Exchange, Ahn and Cheung (1999), Ahn, Bae, and Chan (2001) study the Stock Exchange of Hong Kong.

<sup>2</sup> Harris and Hasbrouck (1996) report that limit orders account for 54% of all orders submitted through the SuperDot system. Ross, Shapiro, and Smith (1996) document that limit orders account for 65% of all executed orders, and 75% of executed shares in the SuperDot system. Cooney, Van Ness, and Van Ness (2003) find that a large numbers of orders on the NYSE are limit orders with even-eighth limit prices.

<sup>3</sup> Chung, Van Ness, and Van Ness (2004) estimate the adverse selection risk component of the spread from limit-order quotes on the NYSE and show that it is greater than the adverse selection risk component from specialist quotes.

<sup>4</sup> One of the reasons is that the value of private information depreciates over time.

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