

Commonality under market stress: Evidence from an order-driven market

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Abstract

Recent evidence shows that commonality in liquidity *decreases* at the aggregate level in a quote-driven specialist market during periods of market stress. Specialists and dealers in quote-driven markets have an affirmative obligation to provide liquidity, even if prices are falling precipitously. The purpose of our study is to investigate commonality in liquidity in a market structure without any affirmative obligation to provide liquidity (i.e., in an order-driven market). We collect intra-day data from one of the world's largest and most active order-driven markets, the Stock Exchange of Hong Kong (SEHK), and find that commonality *increases* during periods of market stress. We also show that larger firms tend to be more susceptible to changes in commonality than smaller firms. We hypothesize that order-driven markets behave differently from quote-driven markets under stress because order-driven market makers have a free exit option.

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1. Introduction

The purpose of our study is to investigate commonality in liquidity in an order-driven market structure during periods of market stress. Commonality refers to the phenomenon whereby the individual firm's liquidity is at least partly determined by market-wide factors. Previous studies have documented the existence of commonality in specialist and dealer markets (Chordia, Roll, & Subrahmanyam, 2000; Hasbrouck & Seppi, 2001; and Huberman & Halka, 2001), as well as in order-driven markets (Brockman & Chung, 2002). Chordia, Sarkar and Subrahmanyam (2005) also examined liquidity co-movements across asset classes including the US equity and Treasury bond markets. More recently, Coughenour and Saad (2004) find evidence of commonality for the stock portfolios traded by specialist firms on the NYSE. They show that under market stress the specialist's portfolio experiences an increase in

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commonality, even though the overall market undergoes a decrease in commonality. The increased level of commonality in the specialist's portfolio is due to information and resource sharing among the firm's members. This liquidity response is unique to the NYSE specialist system, and the authors conclude that (p. 31), "Further research considering liquidity co-variation owing to other structural characteristics at the NYSE and across a wider variety of markets would be of interest." Our study seeks to fill some of this void by analyzing the response of liquidity providers to market stress in an order-driven environment.

Electronic limit order books and order-driven market structures have increased rapidly in recent years due to improvements in information technology and financial market deregulation. Many of the newly emerging equity and derivative markets have adopted order-driven systems, and some of the more mature and well-established exchanges are in the process of expanding their order-driven trading. In an order-driven environment there is no obligation on the part of any market participant to submit limit orders and, consequently, no liquidity supplier of last resort. Precisely how such a liquidity-provision mechanism responds to market-wide stress is an open empirical issue and the focus of our study.

From one perspective, order-driven systems are more susceptible to commonality, particularly when prices are falling, because no market maker possesses an affirmative obligation to maintain a fair and orderly market. Without such an obligation, market makers are free to withdraw their liquidity-provision services during market-wide liquidity shocks. Judging from the large trading losses of specialist firms during previous stock market crashes, specialists would have reduced their liquidity-provision activities if not for this affirmative obligation. Their obligation to *lean against the wind* is all the more onerous when the wind is blowing strongly from one direction. But if specialists are required to stay put during the storm, not only will they provide vital liquidity to the overall market, they will also differentiate high risk and low risk firms in their liquidity-provision decisions. Because specialists have the ability and incentive to produce a separating equilibrium, commonality in liquidity will decrease as some firms receive more liquidity support than others. Order-driven market makers, on the other hand, have the right to seek shelter during such stressful periods. If market makers exit the market during such periods, a pooling equilibrium of liquidity provision is more likely and commonality in liquidity will increase. This perspective stresses the "free exit" aspect of order-driven trading.

From another perspective, however, commonality might be less pervasive in order-driven markets if inventory imbalances are more easily diffused across multiple (independent) liquidity providers, in contrast to the specialist portfolio results reported in Coughenour and Saad (2004). Higher liquidity costs in the form of wider spreads should attract more liquidity suppliers in a market with low barriers to entry. This perspective stresses the "free entry" aspect of order-driven trading. Whereas quote-driven systems impose barriers to entry (e.g., monopolistic specialists) and exit (i.e., via affirmative obligations), order-driven systems generate liquidity demand and supply schedules that more closely approximate equilibrium under perfect competition. Our study represents a first step in understanding how this liquidity-provision process performs under pressure.

We collect intra-day data for bid, ask, transaction prices, and depths from one of the world's largest and most active order-driven markets, the Stock Exchange of Hong Kong (SEHK).² The data set includes all SEHK-listed firms over the sample period from May 1, 1996 to December 31, 1999. While other exchanges possess some order-driven features, most combine various trading mechanisms into a hybrid structure. In contrast, the SEHK is about as pure an order-driven market as obtainable in practice; it has no designated dealers (specialists) or designated order processors (*saitori*). There are no differences between quoted and effective bid–ask spreads on the SEHK since all transactions take place at the screen-quoted price (i.e., there are no dealers or specialists who can trade inside the screen-quoted spread).

Our empirical results show that the level of commonality in liquidity increases during periods of market stress. We test various definitions of market stress, including the stock market crash period of October 1997, and always find a consistent increase in spread-related commonality. This result is similar to Coughenour and Saad's (2004) finding for specialist portfolios but different from their finding for the aggregate market. We hypothesize that the order-driven market's "free exit" characteristic is the underlying cause of this increase in commonality during market stress. We also find that larger firms are more susceptible to increases in commonality than smaller firms when prices fall precipitously.

² In 2000, the SEHK, Hong Kong Futures Exchange Limited, and Hong Kong Securities Clearing Company Limited merged to form a single holding company, the Hong Kong Exchanges and Clearing Limited (HKEx). We will continue to refer to the Exchange as the SEHK because the merger occurred subsequent to our period of investigation.

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