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COMMONALITY IN LIQUIDITY: EVIDENCE FROM AN ORDER-DRIVEN MARKET STRUCTURE

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Abstract

Events such as the 1997 East Asian financial crisis indicate that individual firm liquidity is strongly influenced by marketwide factors. Previous market microstructure research, however, focuses almost exclusively on the firm-specific attributes of liquidity. Our study follows the recent shift in emphasis toward commonality by examining systematic liquidity in an order-driven market structure. Using data from the Stock Exchange of Hong Kong, we show that commonality in liquidity includes both market and industry components, and is pervasive across size-sorted portfolios. We also find a significant market and industry component in individual firms' order flow. In contrast to quote-driven results, we do not find a positive relation between firm size and sensitivity to changes in marketwide bid-ask spreads.

JEL Classification: G15

I. Introduction

The purpose of our study is to investigate commonality of liquidity in an order-driven market structure. Commonality refers to the proposition that an individual firm's liquidity is at least partly determined by marketwide factors. This proposition is as intuitively appealing as it is empirically neglected. The intuitive appeal comes from our knowledge that other firm-specific attributes (e.g., risk and return) are influenced by systematic factors. But although a systematic liquidity component is consistent with financial theory and promising in terms of implications, there is currently little empirical evidence related to such commonality. Previous market microstructure research focuses almost exclusively on issues pertaining to individual securities, such as transaction costs and trading patterns. Only recently is there a discernible shift in emphasis toward analyzing the common determinants of liquidity (Chordia, Roll, and Subrahmanyam 2000; Huberman and Halka 2001). Our study extends this line of research by examining systematic liquidity in a market structure devoid of designated market makers.

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Electronic limit order books and order-driven market structures have increased rapidly in recent years because of 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 initiating or broadening their order-driven trading. In spite of these developments, Handa, Schwartz, and Tiwari (1998, p. 48) note, "Unlike the quote-driven market, liquidity provision in an order-driven market has received relatively little attention in the microstructure literature." This statement is particularly relevant to the topic of commonality.

In an order-driven framework there is no obligation on the part of any market participant to submit limit orders and, consequently, no liquidity supplier of last resort. How such a liquidity-provision mechanism responds to marketwide liquidity changes is an open empirical issue and the focus of our study. From one perspective, order-driven systems are more susceptible to commonality 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 marketwide liquidity shocks. 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. 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 the measurement and analysis of commonality in such markets.

We collect intraday data for bid, ask, and transaction prices, as well as trading volumes and depths from one of the world's largest and most active order-driven markets, the Stock Exchange of Hong Kong (SEHK). The data set includes all SEHK-listed firms over the sample period from May 1, 1996, to December 31, 1999. Although 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. There are no designated dealers (specialists), no designated order processors (*saitori*), no switching from call to continuous markets, no price change limits, no trading halts, and no mandatory quotation periods.

Our results contribute to the incipient commonality literature in several ways. We extend the empirical frontier to another equity market, as well as a longer and more recent period. More important, we analyze the liquidity effect of commonality in an electronic, order-driven market structure. This is the only study to investigate commonality in an environment devoid of any affirmative obligation to provide liquidity. Perhaps our most significant finding is that commonality is not limited to New York Stock Exchange (NYSE) firms or specialist markets. We show that commonality is an important feature of individual firm liquidity in an order-driven market structure. We find that bid-ask spreads, depths, and order flows are significantly influenced by a commonality component. However, in contrast to quote-driven results, we do not find a positive relation between firm size and sensitivity to changes in marketwide bid-ask spreads.

II. Related Research

After Handa, Schwartz, and Tiwari's (1998) comment about the lack of research in order-driven markets, a considerable literature has emerged to address this issue. Recent studies analyze the interday and intraday patterns in bid-ask spreads and depths (Ahn and Cheung 1999; Brockman and Chung 1998, 1999a). Other studies decompose the bid-ask spread into its constituent parts to compare these relative costs with their quote-driven counterparts (Brockman and Chung 1999b; Chan 2000). Using Easley et al.'s (1996) trading model, Brown, Thompson, and Walsh (1999) and Brockman and Chung (2000) investigate informed and uninformed trading behavior in a transparent order-driven environment. Lam and Tong (1999) examine intraday volatility patterns, and Ahn, Bae, and Chan (2001) investigate the relations among limit orders, depth, and volatility in the absence of designated market makers. We extend this research agenda by analyzing commonality in liquidity on an order-driven platform.

Chordia, Roll, and Subrahmanyam (2000) conduct the first (published) empirical study of commonality in liquidity based on 1,169 NYSE firms during 1992. Adopting a simple and intuitive market model approach, they regress various firm-level measures of liquidity (e.g., bid-ask spreads and depths) on market-level liquidity aggregates. The concurrent slope coefficients are positive and statistically significant for approximately 30% to 35% of the NYSE firms, against the null hypothesis of 5%. The economic interpretation is that firm-level liquidity, in terms of both spreads and depths, is significantly affected by changes in marketwide liquidity. This common component remains significant even after controlling for individual determinants of liquidity, including price, volume, and volatility. Additional findings document an industry component of liquidity and a significant size effect.

Hasbrouck and Seppi (2001) investigate common factors in prices, order flow, and liquidity for thirty Dow Jones stocks during 1994. They find strong evidence for common factors in order flows and stock returns, and weaker evidence for commonality in liquidity proxies. Huberman and Halka (2001) also find evidence suggesting the existence of a systematic liquidity component. As this brief literature review demonstrates, the measurement and implications of commonality in liquidity are still at the beginning stages of development, even with respect to quote-driven platforms.

III. SEHK Market Structure and Data

Order entry and execution on the SEHK begins when a trader submits a limit order. The limit order is entered into the Automatic Order Matching and Execution System (AMS), which prioritizes it first by price and then by time. Although order sizes are posted for each bid or ask price level, trade size is not a priority in execution. Bid prices are arranged in priority from highest to lowest, and ask prices are arranged from lowest to highest. The difference between the lowest ask price and the highest bid price represents the bid-ask spread. Trade depth, at the inside spread, is a function of the number of shares available at the lowest ask and highest bid prices. The number of shares available at the highest bid price represents the number of shares a seller can sell without inducing a price decrease. The number of shares available at the lowest ask price represents the number of shares that a buyer can purchase without inducing a price increase. Actual and potential traders are able to observe bid (ask) prices and depths, and the buying (selling) broker's identity. Exchange members observe this trading information on both floor-based and remote trading terminals, and nonexchange members access the same information through (real-time) data providers.

These market features create a trading system that is considerably different from that of previous research on commonality (e.g., NYSE). Exactly how this transparent, order-driven structure affects the behavior of liquidity providers (i.e., the relative effect of free entry versus free exit) can only be addressed through empirical analysis.

We obtain our data set from the SEHK's Research and Planning Division. The data include more than 250 million intraday observations for 725 companies from May 1, 1996, to December 31, 1999 (i.e., 44 months or 903 trading days).[1] We compile bid (ask) prices and depths, transaction prices, and volumes at thirty-second intervals throughout the trading day, which includes a morning session from 10:00 to 12:30 and an afternoon session from 14:30 to 15:55. We partition the 725 firms into quintile portfolios based on average (monthly) market capitalizations with the first (fifth) quintile corresponding to the smallest (largest) capitalization.

Table 1 provides summary statistics for the full sample and the quintile portfolios. All dollar values are presented in terms of Hong Kong dollars, where

[1] Because of an internal clock misalignment in the original data, we make minor adjustments to the time of day for the first eight months of the sample period. These adjustments are made based on information provided by SEHK's Research and Planning officials and verified by our program filters.

TABLE 1. Selected Market Statistics on Trading Activities of Sample Companies from May 1, 1996, to December 31, 1999.

	Full Sample	Size Quintiles 1 (smallest)	2	3	4	5 (largest)
Number of companies in the sample	725	145	145	145	145	145
Mean [median] market capitalization per company (HK$)	$5,149,295,512 [$526,854,218]	$167,139,608 [$154,000,000]	$333,121,736 [$299,000,000]	$618,011,223 [$532,950,000]	$1,384,261,691 [$1,140,079,000]	$23,243,943,302 [$5,030,998,983]
Mean [median] daily trading volume per company in number of shares	5,854,365 [690,000]	2,381,173 [364,000]	5,263,327 [440,000]	6,235,961 [760,000]	7,510,400 [1,011,000]	7,880,964 [1,873,250]
Mean [median] daily trading volume per company in total dollar volume (HK$)	$14,282,234 [$589,300]	$1,536,668 [$165,265]	$2,914,976 [$300,742]	$5,044,951 [$611,040]	$10,296,144 [$1,268,680]	$51,618,432 [$7,836,163]
Mean [median] percentage of trading days with one or more shares traded	67.79% [73.73%]	48.11% [49.78%]	59.00% [63.36%]	70.51% [82.12%]	76.02% [84.44%]	85.32% [99.12%]
Mean [median] percentage of thirty-minute intervals with one or more shares traded	47.29% [45.37%]	24.65% [23.07%]	33.85% [33.65%]	47.35% [49.42%]	55.28% [59.39%]	75.34% [88.40%]
Mean [median] percentage of five-minute intervals with one or more shares traded	27.12% [20.02%]	10.28% [8.26%]	15.73% [13.41%]	24.62% [22.06%]	31.06% [26.49%]	53.91% [55.27%]
Mean [median] percentage of thirty-second intervals with one or more shares traded	12.36% [6.12%]	3.29% [2.41%]	5.70% [3.88%]	9.65% [7.15%]	13.60% [8.81%]	29.56% [21.45%]
Mean [median] share price in thirty-second intervals	$4.487 [$1.071]	$0.797 [$0.555]	$1.855 [$0.847]	$1.557 [$0.964]	$2.702 [$1.468]	$15.524 [$6.226]
Mean [median] absolute bid-ask spread in thirty-second intervals (HK$)	$0.05883 [$0.02348]	$0.02838 [$0.01945]	$0.05561 [$0.02000]	$0.03521 [$0.01926]	$0.04848 [$0.02642]	$0.12646 [$0.05450]
Mean [median] relative bid-ask spread in thirty-second intervals	0.02742 [0.02011]	0.04244 [0.03386]	0.03440 [0.02633]	0.02772 [0.02007]	0.02175 [0.01674]	0.01076 [0.00946]
Mean [median] volume depth in thirty-second intervals	431,463 [171,968]	276,309 [179,656]	459,504 [166,650]	448,263 [184,387]	554,405 [179,364]	418,835 [141,408]
Mean [median] dollar depth in thirty-second intervals (HK$)	$837,826 [$167,113]	$154,613 [$88,551]	$237,739 [$126,408]	$330,407 [$167,113]	$590,273 [$232,172]	$2,876,100 [$685,873]

Note: The sample is made up of the population of all companies with ordinary shares listed on the Stock Exchange of Hong Kong (SEHK) during the sample period. Two trading days (October 14, 1996, and December 12, 1996) are not included in the sample period because data on the bid and ask quotes on these two days were not available from the SEHK. Size quintiles are formed on the basis of the market capitalization of each firm averaged across all months over the sample period.

HK\$7.8 equals US\$1. We report mean and median values because some of the variables have highly skewed distributions. Turning first to the full sample, we note that both measures of central tendency show that the typical SEHK-listed firm has a market value of several hundred million Hong Kong dollars. These companies are actively traded both in terms of share and dollar volumes. The percentage of trading intervals (i.e., daily, thirty-minute, five-minute, and thirty-second intervals) with one or more shares traded also suggests that the average firm is fairly active. Mean and median prices are below those reported on U.S. exchanges, as are the mean and median absolute spreads. Relative (or proportional) spreads represent approximately 2% to 3% of the underlying firm's stock price. The volume and dollar depth figures show that well over 100,000 shares are typically available for immediate purchase and sale without invoking a price change.

The size-based quintile portfolios capture cross-sectional variations in volume, trading activity, price, spreads, and depths. That is, partitioning on the basis of market capitalization generates monotonically increasing quintile portfolios for share and dollar volumes, trading activity at all intervals, and dollar depths. Relative bid-ask spreads decrease monotonically from the smallest to largest size-based portfolios, and all other measures (i.e., prices, absolute spreads, and volume depths) reveal nearly monotonic relations. The results also show that there is considerable variation in volumes, prices, trading activity, spreads, and depths across the size-based portfolios. For example, average dollar trading volume ranges from \$1,536,668 to \$51,618,432 for the first to the fifth quintiles. Consequently, the empirical results are based on a wide range of company trading characteristics.

IV. Empirical Findings

Evidence of Commonality

In this section we follow the approach of Chordia, Roll, and Subrahmanyam (2000) to provide order-driven results comparable to their specialist-based findings.[2] We test for commonality in liquidity using the following firm-by-firm time series regression:

$$\begin{aligned}\Delta Liquidity_{J,t} = {}& \alpha + \beta_1 \Delta Liquidity_{M,t} + \beta_2 \Delta Liquidity_{M,t+1} + \beta_3 \Delta Liquidity_{M,t-1} \\ & + \delta_1 Return_{M,t} + \delta_2 Return_{M,t+1} + \delta_3 Return_{M,t-1} \\ & + \delta_4 \Delta Volatility_{J,t} + \varepsilon_{J,t}, \qquad (1)\end{aligned}$$

[2]Chordia, Roll, and Subrahmanyam's (2000) liquidity measures include absolute and relative quoted spreads, absolute and relative effective spreads, and depths. In an electronic order-driven market, there is no difference between quoted and effective spreads. Trades take place only at posted (i.e., quoted) bid and ask prices. We therefore have no separate category for effective spreads.

where $Liquidity_{J,t}$ is measured by either $ASpread_{J,t}$, $RSpread_{J,t}$, or $Depth_{J,t}$. $ASpread_{J,t}$ is the average absolute (or dollar) bid-ask spread for firm J on day t and is measured as the difference between the lowest ask and the highest bid averaged across all thirty-second intervals over the trading day. Similarly, $RSpread_{J,t}$ is the average relative bid-ask spread and $Depth_{J,t}$ is the average volume depth. $Volatility_{J,t}$ is the return volatility for firm J on trading day t and is measured as the daily average squared return. $Liquidity_{M,t}$ is an equally weighted average of all firms in the market. If the dependent variable ($Liquidity_{J,t}$) is expressed in terms of absolute spreads, $Liquidity_{M,t}$ is an equally weighted average of all firms' absolute spreads. $Return_{M,t}$ is the equally weighted return for all firms in the market. Aggregated independent variables exclude the related dependent variable values; that is, $Liquidity_{M,t}$ is calculated using all firms in the market except firm J. For further comparison with Chordia, Roll and Subrahmanyam, SUM is defined as the sum of the concurrent, lead and lag coefficients of the market liquidity variables. The p-value refers to a sign test with the null hypothesis of H_0: median of SUM $= 0$.

The return and volatility variables in regression (1) serve as control variables. They allow us to isolate the effect of changes in marketwide liquidity on an individual firm's liquidity after controlling for marketwide price swings and changes in firm-specific volatility. The lead and lag liquidity variables capture the effect of nonsynchronous liquidity changes caused by thin trading. Panel A of Table 2 reports the findings for absolute spreads. The mean (median) coefficient of interest, β_1, is 0.187 (0.267). This coefficient is positive and significant at the 5% level for 26.1% of the 725 time-series regressions; it is positive and insignificant for 50.2%, negative and insignificant for 21.8%, and negative and significant for 2.0%. The sum of all liquidity coefficients (i.e., $\beta_1 + \beta_2 + \beta_3$) is also highly significant. These empirical results provide support for the existence of liquidity commonality in an order-driven setting.[3] In addition, our smaller β_1 estimates (compared with Chordia, Roll, and Subrahmanyam's, 2000, quoted and effective mean spreads of 0.690 and 0.280, respectively) suggest that commonality has relatively less effect on absolute spreads for our SEHK sample.

Panel B of Table 2 reports the findings for relative spreads. The mean (median) coefficient of interest, β_1, is 0.737 (0.751). This coefficient is positive and significant at the 5% level for 57.6% of the regressions; it is positive and insignificant for 32.6%, negative and insignificant for 9.6%, and negative and

[3] Hasbrouck and Seppi (2001) do not find significant commonality among the thirty companies of the Dow Jones Industrial Average (DJIA). We test whether their finding is caused by a small sample with little industry overlap. We construct an index similar to the DJIA by selecting the four largest companies from each of seven industries (i.e., four firms from seven industries yielding a total of twenty-eight firms). We reestimate model (1) using the revised index portfolio and find strong evidence of commonality among the twenty-eight firms. This indicates that Hasbrouck and Seppi's results are not driven by sample-specific factors. We thank the referee for suggesting this test, as well as several subsequent robustness tests.

TABLE 2. Marketwide Commonality in Liquidity.

Independent Variable		Mean [Median] of Estimated Coefficient	Number (percent) of Firms with Coefficient >0 and t-statistic Significant at 0.05 Level	Number (percent) of Firms with Coefficient >0 and t-statistic Not Significant at 0.05 Level	Number (percent) of Firms with Coefficient <0 and t-statistic Not Significant at 0.05 Level	Number (percent) of Firms with Coefficient <0 and t-statistic Significant at 0.05 Level
Panel A. $Liquidity \equiv ASpread$						
Intercept	α	0.101 [0.097]	637 (88.8%)	73 (10.2%)	7 (1.0%)	0 (0.0%)
$\Delta Liquidity_{M,t}$	β_1	0.187 [0.267]	187 (26.1%)	360 (50.2%)	156 (21.8%)	14 (2.0%)
$\Delta Liquidity_{M,t+1}$	β_2	0.018 [0.011]	50 (7.0%)	317 (44.2%)	311 (43.4%)	39 (5.4%)
$\Delta Liquidity_{M,t-1}$	β_3	−0.054 [0.006]	45 (6.3%)	321 (44.8%)	304 (42.4%)	47 (6.6%)
$Return_{M,t}$	δ_1	−0.925 [−0.490]	28 (3.9%)	182 (25.4%)	380 (53.0%)	127 (17.7%)
$Return_{M,t+1}$	δ_2	0.220 [0.102]	62 (8.6%)	342 (47.7%)	291 (40.6%)	22 (3.1%)
$Return_{M,t-1}$	δ_3	0.059 [0.010]	67 (9.3%)	298 (41.6%)	325 (45.3%)	27 (3.8%)
$\Delta Volatility_{J,t}$	δ_4	0.000 [0.000]	66 (9.2%)	280 (39.1%)	365 (50.9%)	6 (0.8%)

Total number of regressions: 717
Mean [median] adjusted R^2: 0.0137 [0.0046]
$\text{SUM} \equiv \beta_1 + \beta_2 + \beta_3$: mean [median] {$p$-value}: 0.151 [0.284] {0.000}

Independent Variable		Mean [Median] of Estimated Coefficient	Number (percent) of Firms with Coefficient >0 and t-statistic Significant at 0.05 Level	Number (percent) of Firms with Coefficient >0 and t-statistic Not Significant at 0.05 Level	Number (percent) of Firms with Coefficient <0 and t-statistic Not Significant at 0.05 Level	Number (percent) of Firms with Coefficient <0 and t-statistic Significant at 0.05 Level
Panel B. $Liquidity \equiv RSpread$						
Intercept	α	0.100 [0.098]	640 (89.3%)	69 (9.6%)	7 (1.0%)	1 (0.1%)
$\Delta Liquidity_{M,t}$	β_1	0.737 [0.751]	413 (57.6%)	234 (32.6%)	69 (9.6%)	1 (0.1%)
$\Delta Liquidity_{M,t+1}$	β_2	0.096 [0.048]	76 (10.6%)	319 (44.5%)	285 (39.7%)	37 (5.2%)
$\Delta Liquidity_{M,t-1}$	β_3	0.038 [0.078]	81 (11.3%)	345 (48.1%)	267 (37.2%)	24 (3.3%)
$Return_{M,t}$	δ_1	−0.510 [−0.393]	30 (4.2%)	209 (29.1%)	357 (49.8%)	121 (16.9%)
$Return_{M,t+1}$	δ_2	0.296 [0.052]	60 (8.4%)	325 (45.3%)	315 (43.9%)	17 (2.4%)
$Return_{M,t-1}$	δ_3	−0.328 [−0.139]	39 (5.4%)	270 (37.7%)	363 (50.6%)	45 (6.3%)
$\Delta Volatility_{J,t}$	δ_4	0.001 [0.000]	64 (8.9%)	284 (39.6%)	362 (50.5%)	7 (1.0%)

Total number of regressions: 717
Mean [median] adjusted R^2: 0.0278 [0.0164]
$\text{SUM} \equiv \beta_1 + \beta_2 + \beta_3$: mean [median] {$p$-value}: 0.871 [0.912] {0.000}

Panel C. *Liquidity* ≡ *Depth*

Intercept	α	0.205 [0.175]	663 (92.5%)	48 (6.7%)	5 (0.7%)	1 (0.1%)
$\Delta Liquidity_{M,t}$	β_1	0.438 [0.298]	271 (37.8%)	298 (41.6%)	141 (19.7%)	7 (1.0%)
$\Delta Liquidity_{M,t+1}$	β_2	0.240 [−0.009]	91 (12.7%)	257 (35.8%)	331 (46.2%)	38 (5.3%)
$\Delta Liquidity_{M,t-1}$	β_3	0.228 [−0.009]	80 (11.2%)	271 (37.8%)	304 (42.4%)	62 (8.6%)
$Return_{M,t}$	δ_1	0.136 [0.399]	89 (12.4%)	345 (48.1%)	248 (34.6%)	35 (4.9%)
$Return_{M,t+1}$	δ_2	0.377 [−0.101]	35 (4.9%)	308 (43.0%)	338 (47.1%)	36 (5.0%)
$Return_{M,t-1}$	δ_3	0.169 [−0.203]	31 (4.3%)	288 (40.2%)	365 (50.9%)	33 (4.6%)
$\Delta Volatility_{J,t}$	δ_4	0.000 [0.000]	46 (6.4%)	224 (31.2%)	442 (61.6%)	5 (0.7%)

Total number of regressions: 717
Mean [median] adjusted R^2: 0.0208 [0.0030]
SUM ≡ $\beta_1 + \beta_2 + \beta_3$: mean [median] {$p-$value}: 0.906 [0.247] {0.000}

Note: Firm-by-firm time-series regressions of company liquidity on market liquidity measures are estimated using

$$\Delta Liquidity_{J,t} = \alpha + \beta_1 \Delta Liquidity_{M,t} + \beta_2 \Delta Liquidity_{M,t+1} + \beta_3 \Delta Liquidity_{M,t-1} + \delta_1 Return_{M,t} + \delta_2 Return_{M,t+1} + \delta_3 Return_{M,t-1} + \delta_4 \Delta Volatility_{J,t} + \varepsilon_{J,t},$$

where $Liquidity_{J,t}$ is measured by either $ASpread_{J,t}$, $RSpread_{J,t}$, or $Depth_{J,t}$. $ASpread_{J,t}$ is the absolute bid-ask spread for firm J on day t and is measured as the difference between the lowest ask and the highest bid averaged across all thirty-second intervals over the trading day. $RSpread_{J,t}$ is the relative bid-ask spread, which is the absolute spread divided by the bid-ask midpoint averaged across all thirty-second intervals over the day. $Depth_{J,t}$ is the volume depth and is measured by the total number of all shares quoted at the highest bid plus the total number of all shares quoted at the lowest ask averaged across all thirty-second intervals over the trading day. $Volatility_{J,t}$ is the return volatility for firm J on trading day t and is measured as the squared return for the day. $Liquidity_{M,t}$ is the equally weighted average on day t of the respective liquidity measures for all firms in the sample representing the market. $Return_{M,t}$ is the equally weighted average of the daily return for all firms in the market. The symbol Δ preceding a variable name denotes a proportional change in the variable across successive trading days. As in Chordia, Roll, and Subrahmanyam (2000), the market averages exclude the specific dependent variable firm in each regression. For further comparison with Chordia, Roll, and Subrahmanyam, SUM is defined as the sum of the concurrent, lag and lead coefficients of the market liquidity variables, and the p-value is from the sign test for the null hypothesis of H_0: median of SUM = 0.

significant for only 0.1%. The sum of all liquidity coefficients is highly significant. Again, our average relative spread coefficient is smaller than that reported for the specialist-based market (i.e., 0.791), although the difference is much less than with the absolute spreads. Panel C reports the findings for the depth measure of liquidity. The mean (median) β_1 coefficient is 0.438 (0.298); 37.8% of these coefficients are positive and significant, 41.6% are positive and insignificant, 19.7% are negative and insignificant, and 1.0% are negative and significant. The sum of all liquidity coefficients is highly significant. Consistent with the absolute spread measures, our average depth coefficient is substantially smaller than that reported in the specialist market (i.e., 1.373). In summary, the results in Table 2 confirm that commonality is an important feature of the liquidity provision process on order-driven platforms.[4] The evidence also suggests that the free-entry aspect of such markets reduces the effect of marketwide liquidity on the individual firm.[5]

Table 3 reports the results of model (1) grouped by size-based quintile portfolios. In the interest of space, we display only the coefficients of interest (i.e., β_1). The absolute spread results in Panel A show that the middle third quintile has the highest sensitivity to commonality. These findings are robust to mean and median individual β_1 values, as well as mean and median summations of β_1, β_2, and β_3 values. The same inverted U-shape pattern can also be seen for the relative spreads in Panel B. These bid-ask spread results are different from those reported in Chordia, Roll, and Subrahmanyam (2000). For NYSE firms, sensitivity to commonality increases in a consistently monotonic manner from lower to higher capitalization portfolios. Large NYSE firms are more susceptible to marketwide changes in liquidity than small firms. In contrast, our results show that large firms have relatively small β coefficients when liquidity is measured in terms of spreads.

Panel C of Table 3 reports the depth results. The individual and combined β coefficients do not follow as distinct a pattern as found for spreads. However, the largest quintile portfolio is consistently the most sensitive to changes in marketwide depth. Investors that trade large firms respond to changes in market liquidity by revising the number of shares in which they are willing to transact, relative to revising the bid-ask spread. Although identifying the underlying reason for these size-based patterns is beyond the scope of our study, the empirical evidence confirms the

[4]We perform additional tests of robustness by reestimating model (1) using various intervals including five, fifteen, and thirty minutes. All of the results confirm those reported in Table 2.

[5]These relatively lower sensitivities to commonality can also be driven by Chordia, Roll, and Subrahmanyam's (2000) filtering rules that expunge smaller firms from their sample. For example, they exclude firms that are not listed over their entire sample period, firms with low average prices (below US$2), and firms with inactive trading (less than ten trading days). We test the robustness of our findings by filtering out firms that are not listed over the entire sample period or have less than thirty trading days. The results continue to show generally less sensitivity to commonality than comparable estimates in the specialist-based market structure.

TABLE 3. Marketwide Commonality in Liquidity by Size Quintiles.

Size Quintiles	Number of Firms	Mean [Median] Estimated β_1 Coefficient of Concurrent Market Liquidity $\Delta Liquidity_{M,t}$	Number (Percent) of Firms with Coefficient >0 and *t*-statistic Significant at 0.05 Level	Number (Percent) of Firms with Coefficient >0 and *t*-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient <0 and *t*-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient <0 and *t*-statistic Significant at 0.05 Level	SUM $\equiv \beta_1 + \beta_2 + \beta_3$ Mean [Median] {*p*-value}
Panel A. *Liquidity* $\equiv$ *ASpread*							
5 (largest)	144	0.199 [0.250]	67 (46.5%)	55 (38.2%)	19 (13.2%)	3 (2.1%)	0.261 [0.222] {0.000}
4	144	0.205 [0.279]	46 (31.9%)	71 (49.3%)	26 (18.1%)	1 (0.7%)	0.207 [0.337] {0.000}
3	142	0.359 [0.330]	39 (27.5%)	83 (58.5%)	20 (14.1%)	0 (0.0%)	0.479 [0.425] {0.000}
2	143	0.149 [0.284]	21 (14.7%)	74 (51.7%)	45 (31.5%)	3 (2.1%)	−0.053 [0.220] {0.009}
1 (smallest)	144	0.028 [0.182]	14 (9.7%)	77 (53.5%)	46 (31.9%)	7 (4.9%)	−0.133 [0.276] {0.078}
Panel B. *Liquidity* $\equiv$ *RSpread*							
5 (largest)	144	0.517 [0.573]	107 (74.3%)	27 (18.8%)	10 (6.9%)	0 (0.0%)	0.660 [0.588] {0.000}
4	144	0.783 [0.788]	95 (66.0%)	40 (27.8%)	9 (6.3%)	0 (0.0%)	1.035 [0.879] {0.000}
3	142	0.865 [0.851]	85 (59.9%)	50 (35.2%)	7 (4.9%)	0 (0.0%)	1.085 [1.048] {0.000}
2	143	0.710 [0.795]	69 (48.3%)	55 (38.5%)	19 (13.3%)	0 (0.0%)	0.864 [0.988] {0.000}
1 (smallest)	144	0.808 [0.887]	57 (39.6%)	62 (43.1%)	24 (16.7%)	1 (0.7%)	0.712 [0.953] {0.000}

(Continued)

TABLE 3. Continued.

Size Quintiles	Number of Firms	Mean [Median] Estimated β_1 Coefficient of Concurrent Market Liquidity $\Delta Liquidity_{M,t}$	Number (Percent) of Firms with Coefficient >0 and t-statistic Significant at 0.05 Level	Number (Percent) of Firms with Coefficient >0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient <0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient <0 and t-statistic Significant at 0.05 Level	$SUM \equiv \beta_1 + \beta_2 + \beta_3$ Mean [Median] {p-value}
Panel C. *Liquidity* ≡ *Depth*							
5 (largest)	144	1.187 [0.428]	95 (66.0%)	38 (26.4%)	11 (7.6%)	0 (0.0%)	2.362 [0.322] {0.000}
4	144	0.272 [0.238]	54 (37.5%)	65 (45.1%)	25 (17.4%)	0 (0.0%)	0.241 [0.178] {0.000}
3	142	0.330 [0.307]	57 (40.1%)	59 (41.5%)	25 (17.6%)	1 (0.7%)	0.320 [0.191] {0.000}
2	143	0.345 [0.263]	40 (28.0%)	68 (47.6%)	33 (23.1%)	2 (1.4%)	0.561 [0.314] {0.000}
1 (smallest)	144	0.055 [0.164]	25 (17.4%)	68 (47.2%)	47 (32.6%)	4 (2.8%)	1.033 [0.239] {0.000}

Note: Size quintiles are formed on the basis of the market capitalization of each firm averaged across all months over the sample period. Firm-by-firm time-series regressions of company liquidity on market liquidity measures are estimated using

$$\Delta Liquidity_{J,t} = \alpha + \beta_1 \Delta Liquidity_{M,t} + \beta_2 \Delta Liquidity_{M,t+1} + \beta_3 \Delta Liquidity_{M,t-1} + \delta_1 Return_{M,t} + \delta_2 Return_{M,t+1} + \delta_3 Return_{M,t-1} + \delta_4 \Delta Volatility_{J,t} + \varepsilon_{J,t},$$

where $Liquidity_{J,t}$ is measured by either $ASpread_{J,t}$, $RSpread_{J,t}$, or $Depth_{J,t}$. $ASpread_{J,t}$ is the absolute bid-ask spread for firm J on day t and is measured as the difference between the lowest ask and the highest bid averaged across all thirty-second intervals over the trading day. $RSpread_{J,t}$ is the relative bid-ask spread, which is the absolute spread divided by the bid-ask midpoint averaged across all thirty-second intervals over the day. $Depth_{J,t}$ is the volume depth and is measured by the total number of all shares quoted at the highest bid plus the total number of all shares quoted at the lowest ask averaged across all thirty-second intervals over the trading day. $Volatility_{J,t}$ is the return volatility for firm J on trading day t and is measured as the squared return for the day. $Liquidity_{M,t}$ is the equally weighted average on day t of the respective liquidity measures for all firms in the sample representing the market. $Return_{M,t}$ is the equally weighted average of the daily return for all firms in the market. The symbol Δ preceding a variable name denotes a proportional change in the variable across successive trading days. As in Chordia, Roll, and Subrahmanyam (2000), the market averages exclude the specific dependent variable firm in each regression. For further comparison with Chordia, Roll, and Subrahmanyam, SUM is defined as the sum of the concurrent, lag and lead coefficients of the market liquidity variables, and the p-value is from the sign test for the null hypothesis of H_0: median of SUM = 0. This table shows regression results on the estimated commonality coefficients of only the market liquidity variables; estimated coefficients of the additional regressors (i.e., the market return and company volatility variables) are not reported.

existence of commonality in liquidity across all quintile portfolios.[6] We also note that the percentage of firms with positive and significant β_1 coefficients generally increases with firm size, a result consistent with the findings in Chordia, Roll, and Subrahmanyam (2000).

In Table 4, we test for industrywide commonality using the following regression model:

$$\begin{aligned}\Delta Liquidity_{J,t} = \alpha &+ \beta_1 \Delta Liquidity_{M,t} + \beta_2 \Delta Liquidity_{M,t+1} + \beta_3 \Delta Liquidity_{M,t-1} \\ &+ \gamma_1 \Delta Liquidity_{I,t} + \gamma_2 \Delta Liquidity_{I,t+1} + \gamma_3 \Delta Liquidity_{I,t-1} \\ &+ \delta_1 Return_{M,t} + \delta_2 Return_{M,t+1} + \delta_3 Return_{M,t-1} \\ &+ \delta_4 \Delta Volatility_{J,t} + \varepsilon_{J,t}, \end{aligned} \tag{2}$$

where $Liquidity_{I,t}$ is the equally weighted average of the respective liquidity measure for all firms in the industry, excluding firm J. All other variables are the same as defined in model (1). We classify sample firms into one of seven industries (i.e., industrials, hotels, properties, consolidated enterprises, finance, utilities, and miscellaneous) as designated by the SEHK.[7] Similar to the earlier discussion, the coefficients of primary interest include the concurrent marketwide effect on firm liquidity (β_1) and the industrywide effect on firm liquidity (γ_1). Panel A reports the results for absolute spreads. The concurrent market and industry coefficients are positive and statistically significant for 17.3% and 13.5%, respectively, of the time-series regressions. This evidence shows that individual firms' absolute spreads are significantly influenced by changes in market- and industry-specific factors.

The results for relative spreads and depths are reported in Panels B and C, respectively. Panel B shows that although marketwide liquidity continues to exert a strong influence on the firm (38.5% are positive and significant), the effect of industry-specific factors on concurrent relative spreads is only marginally significant (6.6% are positive and significant). However, the combined lead, lag, and concurrent effect (SUM_I) is positive and significant at the 1% level. The depth results in Panel C reveal significant industry effects for both the concurrent and combined coefficients. Overall, the findings in Table 4 demonstrate that industrywide factors

[6] We repeat the Table 3 results at five-, fifteen-, and thirty-minute intervals. The inverted U-shape for absolute and relative spreads is preserved at all intervals, although the largest quintile portfolio does not always display the least vulnerability to commonality. The depth pattern is also preserved at all intervals (i.e., the largest quintile has the largest β_1 coefficient).

[7] We also group model (1) results by industry instead of size (i.e., seven industry portfolios instead five size-based portfolios). We find significant commonality effects in spreads and depths for each of the seven industries, thereby verifying that commonality is not driven by one or two industries. We also note that the regulated utilities industry exhibits relatively high levels of commonality, particularly with respect to depth.

TABLE 4. Market and Industry Commonality in Liquidity.

Independent Variable		Mean [Median] of Estimated Coefficient	Number (Percent) of Firms with Coefficient > 0 and t-statistic Significant at 0.05 Level	Number (Percent) of Firms with Coefficient > 0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient < 0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient < 0 and t-statistic Significant at 0.05 Level	SUM_M and SUM_I: Mean [Median] {p-value}
Panel A. $Liquidity \equiv ASpread$							
$\Delta Liquidity_{M,t}$	β_1	0.158 [0.168]	124 (17.3%)	371 (51.8%)	203 (28.4%)	18 (2.5%)	0.117 [0.197] {0.000}
$\Delta Liquidity_{M,t+1}$	β_2	−0.007 [−0.004]	46 (6.4%)	311 (43.4%)	318 (44.4%)	41 (5.7%)	
$\Delta Liquidity_{M,t-1}$	β_3	−0.035 [0.002]	49 (6.8%)	312 (43.6%)	309 (43.2%)	46 (6.4%)	
$\Delta Liquidity_{I,t}$	γ_1	0.116 [0.098]	97 (13.5%)	354 (49.4%)	246 (34.4%)	19 (2.7%)	0.140 [0.083] {0.000}
$\Delta Liquidity_{I,t+1}$	γ_2	0.018 [0.002]	51 (7.1%)	312 (43.6%)	317 (44.3%)	36 (5.0%)	
$\Delta Liquidity_{I,t-1}$	γ_3	0.006 [0.005]	56 (7.8%)	311 (43.4%)	303 (42.3%)	46 (6.4%)	
Panel B. $Liquidity \equiv RSpread$							
$\Delta Liquidity_{M,t}$	β_1	0.780 [0.726]	276 (38.5%)	318 (44.4%)	113 (15.8%)	9 (1.3%)	0.948 [0.809] {0.000}
$\Delta Liquidity_{M,t+1}$	β_2	0.086 [0.015]	63 (8.8%)	306 (42.7%)	294 (41.1%)	53 (7.4%)	
$\Delta Liquidity_{M,t-1}$	β_3	0.083 [0.093]	54 (7.5%)	367 (51.3%)	259 (36.2%)	36 (5.0%)	
$\Delta Liquidity_{I,t}$	γ_1	0.008 [0.026]	47 (6.6%)	342 (47.8%)	291 (40.6%)	36 (5.0%)	0.002 [0.051] {0.008}
$\Delta Liquidity_{I,t+1}$	γ_2	−0.013 [0.022]	57 (8.0%)	341 (47.6%)	283 (39.5%)	35 (4.9%)	
$\Delta Liquidity_{I,t-1}$	γ_3	0.007 [0.004]	48 (6.7%)	314 (43.9%)	313 (43.7%)	41 (5.7%)	

(Continued)

TABLE 4. Continued.

Independent Variable		Mean [Median] of Estimated Coefficient	Number (Percent) of Firms with Coefficient > 0 and t-statistic Significant at 0.05 Level	Number (Percent) of Firms with Coefficient > 0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient < 0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient < 0 and t-statistic Significant at 0.05 Level	SUM_M and SUM_I: Mean [Median] {p-value}
Panel C. $Liquidity \equiv Depth$							
$\Delta Liquidity_{M,t}$	β_1	0.233 [0.229]	170 (23.7%)	304 (42.5%)	218 (30.4%)	24 (3.4%)	0.550 [0.160] {0.000}
$\Delta Liquidity_{M,t+1}$	β_2	0.093 [0.003]	69 (9.6%)	291 (40.6%)	313 (43.7%)	43 (6.0%)	
$\Delta Liquidity_{M,t-1}$	β_3	0.224 [−0.014]	57 (8.0%)	296 (41.3%)	298 (41.6%)	65 (9.1%)	
$\Delta Liquidity_{I,t}$	γ_1	0.216 [0.062]	135 (18.9%)	273 (38.1%)	259 (36.2%)	49 (6.8%)	0.393 [0.126] {0.000}
$\Delta Liquidity_{I,t+1}$	γ_2	0.134 [−0.008]	77 (10.8%)	273 (38.1%)	315 (44.0%)	51 (7.1%)	
$\Delta Liquidity_{I,t-1}$	γ_3	0.007 [0.004]	48 (6.7%)	314 (43.9%)	313 (43.7%)	41 (5.7%)	

Note: Firm-by-firm time-series regressions of company liquidity on market and industry liquidity measures are estimated using

$$\Delta Liquidity_{J,t} = \alpha + \beta_1 \Delta Liquidity_{M,t} + \beta_2 \Delta Liquidity_{M,t+1} + \beta_3 \Delta Liquidity_{M,t-1} + \gamma_1 \Delta Liquidity_{I,t} + \gamma_2 \Delta Liquidity_{I,t+1} + \gamma_3 \Delta Liquidity_{I,t-1} + \delta_1 Return_{M,t} + \delta_2 Return_{M,t+1} + \delta_3 Return_{M,t-1} + \delta_4 \Delta Volatility_{J,t} + \varepsilon_{J,t},$$

where $Liquidity_{J,t}$ is measured by either $ASpread_{J,t}$, $RSpread_{J,t}$, or $Depth_{J,t}$. $ASpread_{J,t}$ is the absolute bid-ask spread for firm J on day t and is measured as the difference between the lowest ask and the highest bid averaged across all thirty-second intervals over the trading day. $RSpread_{J,t}$ is the relative bid-ask spread, which is the absolute spread divided by the bid-ask midpoint averaged across all thirty-second intervals over the day. $Depth_{J,t}$ is the volume depth and is measured by the total number of all shares quoted at the highest bid plus the total number of all shares quoted at the lowest ask averaged across all thirty-second intervals over the trading day. $Volatility_{J,t}$ is the return volatility for firm J on trading day t and is measured as the squared return for the day. $Liquidity_{M,t}$ is the equally weighted average on day t of the respective liquidity measures for all firms in the sample representing the market. $Return_{M,t}$ is the equally weighted average of the daily return for all firms in the market. Sample firms are classified into seven industry sectors as designated by the Stock Exchange of Hong Kong. $Liquidity_{I,t}$ is the equally weighted average of the liquidity measure for all firms in an industry. The symbol Δ preceding a variable name denotes a proportional change in the variable across successive trading days. As in Chordia, Roll, and Subrahmanyam (2000), the market and industry averages exclude the specific dependent variable firm in each regression. For further comparison with Chordia, Roll, and Subrahmanyam, SUM_M and SUM_I are defined as the sum of the concurrent, lag, and lead coefficients of the respective market and industry liquidity variables, and the p-value is from the sign test for the null hypothesis of H_0: median of $\text{SUM}_M = 0$ or median of $\text{SUM}_I = 0$, as appropriate. This table shows regression results on the estimated commonality coefficients of only the market and industry liquidity variables; estimated coefficients of the additional regressors (i.e., the market return and company volatility variables) are not reported.

play a significant role with respect to individual firm liquidity, although mean and median industry coeffients are always less than their marketwide counterparts.[8]

Sources of Commonality

Chordia, Roll, and Subrahmanyam (2000, 2001) provide empirical results for the determinants of commonality in a specialist-based market structure. Our objective in this section is to provide parallel results for the order-driven environment. Previous microstructure research suggests that inventory risks and information asymmetries can generate commonality in liquidity. Common components in volume or volatility can induce positive correlations in dealer inventory levels, thereby affecting bid-ask spreads and depths in a systematic manner. Chordia, Roll, and Subrahmanyam (2000) also ague that asymmetric information can exist at the industry or market level in the form of new technology developments.

The first empirical test is based on the findings of Jones, Kaul, and Lipson (1994). They show that the information-relevant dimension of trading volume is contained in the number of trades, and not the trade size. Consistent with this proposition, Barclay and Warner (1993) show that informed traders break up their orders into medium-size trades to conceal their identity. The act of systematically breaking up informed orders generates a positive (empirical) association between the numbers of trades and their informativeness. We test for marketwide and industrywide commonality in order flow using the following regression model:

$$\begin{aligned}\Delta NTrades_{J,t} = \alpha &+ \theta_1 \Delta NTrades_{M,t} + \theta_2 \Delta NTrades_{M,t+1} + \theta_3 \Delta NTrades_{M,t-1} \\ &+ \lambda_1 \Delta NTrades_{I,t} + \lambda_2 \Delta NTrades_{I,t+1} + \lambda_3 \Delta NTrades_{I,t-1} \\ &+ \delta_1 Return_{M,t} + \varepsilon_{J,t}, \qquad (3)\end{aligned}$$

where $NTrades_{J,t}$ measures the transaction frequency and is the total number of trades for firm J during the trading day t. $NTrades_{M,t}$ ($NTrades_{I,t}$) is the equally weighted average on day t of the number of trades for all firms in the sample representing the market (industry), exclusive of firm J. $Return_{M,t}$ is defined the same as earlier.

Table 5 reports the results of model (3). The marketwide concurrent coefficient, θ_1, is positive and significant for 30.4% of the time-series regressions, and the sum of lead, lag, and concurrent market coefficients is positive and highly

[8]Chordia, Roll, and Subrahmanyam (2000) test for cross-equation dependencies by performing time-series regressions on the residuals of adjacent companies (arranged alphabetically). They report that the mean level of dependency is insufficient to significantly affect their overall results. We apply the same method to our data and find even lower levels of dependency (i.e., lower percentages of significant t-values). We also repeat all analyses using value-weighted market and industry measures. The results confirm the equally weighted findings.

TABLE 5. Commonality in Transaction Frequency.

Independent Variable		Mean [Median] of Estimated Coefficient	Number (Percent) of Firms with Coefficient >0 and t-statistic Significant at 0.05 Level	Number (Percent) of Firms with Coefficient >0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient <0 and t-statistic Not Significant at 0.05 Level	Number (Percent) of Firms with Coefficient <0 and t-statistic Significant at 0.05 Level	SUM_M and SUM_I: Mean [Median] {p-value}
$\Delta NTrades_{M,t}$	θ_1	0.586 [0.553]	218 (30.4%)	291 (40.6%)	187 (26.1%)	21 (2.9%)	0.269 [0.519] {0.000}
$\Delta NTrades_{M,t+1}$	θ_2	−0.123 [−0.041]	40 (5.6%)	296 (41.3%)	348 (48.5%)	33 (4.6%)	
$\Delta NTrades_{M,t-1}$	θ_3	−0.194 [−0.101]	31 (4.3%)	278 (38.8%)	364 (50.8%)	44 (6.1%)	
$\Delta NTrades_{I,t}$	λ_1	0.388 [0.223]	158 (22.0%)	273 (38.1%)	239 (33.3%)	47 (6.6%)	0.662 [0.291] {0.000}
$\Delta NTrades_{I,t+1}$	λ_2	0.089 [0.012]	52 (7.3%)	315 (43.9%)	325 (45.3%)	25 (3.5%)	
$\Delta NTrades_{I,t-1}$	λ_3	0.185 [0.044]	46 (6.4%)	346 (48.3%)	300 (41.8%)	25 (3.5%)	

Note: Firm-by-firm time-series regressions of company number of trades on market and industry number of trades measures are estimated using

$$\Delta NTrades_{J,t} = \alpha + \theta_1 \Delta NTrades_{M,t} + \theta_2 \Delta NTrades_{M,t+1} + \theta_3 \Delta NTrades_{M,t-1} + \lambda_1 \Delta NTrades_{I,t} + \lambda_2 \Delta NTrades_{I,t+1} + \lambda_3 \Delta NTrades_{I,t-1} + \delta_1 Return_{M,t} + \varepsilon_{J,t},$$

where $NTrades_{J,t}$ measures the transaction frequency and is the total number of trades for firm J during the trading day t. $NTrades_{M,t}$ is the equally weighted average on day t of the number of trades for all firms in the sample representing the market. $Return_{M,t}$ is the equally weighted average of the daily return for all firms in the market. Sample firms are classified into seven industry sectors as designated by the Stock Exchange of Hong Kong. $NTrades_{I,t}$ is the equally weighted average of the number of trades measure for all firms in an industry. The symbol Δ preceding a variable name denotes a proportional change in the variable across successive trading days. As in Chordia, Roll, and Subrahmanyam (2000), the market and industry averages exclude the specific dependent variable firm in each regression. For further comparison with Chordia, Roll, and Subrahmanyam, SUM_M and SUM_I are defined as the sum of the concurrent, lag, and lead coefficients of the respective market and industry variables, and the p-value is from the sign test for the null hypothesis of H_0: median of $\mathrm{SUM}_M = 0$ or median of $\mathrm{SUM}_I = 0$, as appropriate. This table shows regression results on the estimated commonality coefficients of only the market and industry variables; estimated coefficients of the additional regressor (i.e., the market return variable) are not reported.

significant. Similarly, the concurrent industrywide coefficient, λ_1, is positive and significant for 22.0% of the time-series regressions, and the sum of its lead, lag, and concurrent coefficients is positive and highly significant. Commonality in trade frequency confirms the results reported for firms listed on NYSE's specialist-based platform. If the number of trades is a good indicator of informed trading, the results suggest there is a common component in asymmetric information (both at the market and industry levels).

V. Summary and Conclusion

Previous market microstructure research focuses almost exclusively on the individual firm as the unit of interest. However, events such as the 1997 East Asian financial crisis and the 1998 debt market crisis strongly suggest that liquidity provision is subject to systematic factors. Recent empirical research by Chordia, Roll, and Subrahmanyam (2000), Hasbrouck and Seppi (2001), and Huberman and Halka (2001) follows this line of reasoning. Our study contributes to this nascent literature by examining systematic liquidity in an order-driven market structure. Precisely how such a liquidity-provision mechanism responds to marketwide liquidity changes is an open empirical issue and provides the primary motivation for our study.

The free-exit perspective of order-driven systems suggests they are more susceptible to commonality because no market maker possesses an affirmative obligation to maintain a fair and orderly market. The free-entry perspective suggests that commonality might be less pervasive as inventory imbalances are more easily diffused across various liquidity providers. Quote-driven systems impose barriers to entry and exit, but also offer a form of liquidity supplier of last resort. Order-driven systems allow the price (i.e., bid-ask spreads) and quantity (i.e., depths) of liquidity-provision services to be determined in a more openly competitive environment without any obligation to supply liquidity during times of need. Our study represents a first step in the measurement and analysis of commonality in such markets.

The empirical results are based on more than 250 million intraday observations from the SEHK for 725 companies from May 1, 1996, to December 31, 1999. We show that commonality is a significant component of individual firm liquidity in an order-driven market structure. The effect of systematic liquidity is generally less than that reported in the quote-driven environment. We find that commonality in spreads and depths is important across all size-based portfolios, although spread-related commonality is relatively more pronounced for the middle range of firms. In contrast to the findings of Chordia, Roll, and Subrahmanyam (2000), large SEHK firms are generally less susceptible to systematic changes in spreads. We document an industrywide liquidity component in addition to the marketwide component. The estimated coefficients of the industrywide component are generally smaller than their marketwide counterparts. In addition to confirming the existence of systematic liquidity, we provide preliminary evidence on the determinants of commonality. Trading frequency is shown to have marketwide and industrywide components.

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