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Commonality of Liquidity around the World: Evaluation of Possible Reasons

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Commonality of Liquidity Around the World: Evaluation of Possible Reasons

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by
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Dedication

To my wife… We made sacrifices for what we believed in. We chose to leave our country, home, families and the city that we love to study for our doctorates. We went back to scratch from what we built for years. Everything is meaningful only with you.

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Abstract

We identify some of the factors affecting the extent of commonality in liquidity and differences between different stock exchanges around the world. With a comprehensive approach, our investigation centers on presenting evidence on the existence of commonality in liquidity, effect of using different measures of market variables on the level of commonality, factors that change the likelihood of stocks having commonality and factors explaining the different levels of commonality across markets. For the individual stock liquidity, we employ most common and reliable liquidity measures including quoted bid and ask spread, proportional spread, effective spread, proportional effective spread and percentage spread. For the market liquidity, we calculate the equal weighted and value weighted averages of the individual stock liquidity measures. Our base model of commonality of liquidity is an extension of Chordia, Roll, and Subrahmanyam (2000). Our data includes 36,457 common stocks in 46 stock exchanges in 33 countries. Our data period begins on January, 2000 and covers until the end of December, 2007. Our results show that 14.38% of all stocks in the world have commonality in liquidity with their markets when equally weighted market variables are used. This percentage drops to 9.76% with using value weighted market variables. After controlling for commonality in certain days of the week, we find that commonality is, in most part, uniformly distributed across days-of-the-week, almost for all countries. We also find that market factors including average spread, average price, average return, average risk, average size, legal system (common vs. civil law) and distribution of mean company size affect the likelihood of companies having commonality within their exchanges. In terms of the different levels across countries, we find that average percentage spread, level of risk, distribution of mean company size and legal system all have significant effects. Our results contribute to the literature analyzing factors that

affect the level of commonality and types of companies that are likely to have commonality. Our study also has practical implications for portfolio diversification by providing evidence for possible reasons for common liquidity movements in the markets which may eventually lead to market liquidity crunches.

Keywords: Liquidity, commonality, measuring change in liquidity, measures of daily liquidity.

Introduction

Prior to Chordia, Roll, and Subrahmanyam (2000), market-microstructure studies primarily, if not solely, focused on liquidity attributes (such as volatility, volume, and price) of an individual asset. Chordia et al. are the first to point out that a missing element in this line of research is the possibility of an individual asset's co-movement with market- and industry-wide liquidity. They empirically test this proposition and provide evidence suggesting that "even after accounting for well-known individual determinants of liquidity……, commonality retains a significant influence" (p. 26). For future research, they suggest identification of macroeconomic sources that might explain such commonality in liquidity.

Subsequent to Chordia et al. (2000), several authors have found evidence of commonality (Hasbrouck & Seppi, 2001; Huberman & Halka, 2001; Fabre & Frino, 2004; Gibson & Mougeot, 2004; Martinez, Nieto, Rubio, & Tapia, 2005; Lee K. H., 2005). However, none of these studies have examined the sources of commonality in detail. More recently, Brockman, Chung and Perignon (2008) have attempted to identify the sources of commonality. However, our study is different in five dimensions. First, we are including much larger sample for the markets that we analyze. Sample size is an important consideration for commonality studies due to the fact that most results are compared based on percentage of companies with commonality within the sample. Thus, with a sample of 55 stocks for American Stock Exchange, 12 stocks with commonality would be about 22% of the market whereas with a sample of 509 stocks, it would mean about 2%. Second, we are evaluating market-wide factors that may explain the differences in percentage of companies with commonality between different equity markets. Third, we are employing a logistic estimation to evaluate idiosyncratic factors that change the likelih-

ood of companies having commonality. Fourth, we are evaluating possible measurement issues that may bias the level of commonality presented in previous studies. Finally, we are evaluating the issue of cross-sectional correlated residuals for different stocks within the same equity markets. Existence of correlated residuals would deem the results spurious. Instead of testing for correlated residuals between companies that are in alphabetically order (or in a random order), we test pair-wise correlations among all possible combinations of residuals. Having found sufficient evidence to suggest that such cross-sectional residual correlation is not of concern, we extend our study with random effects panel data estimation and present evidence for the robustness of our results.

The purpose of this dissertation is to identify the factors that contribute to liquidity commonality as recommended by Chordia, Roll, and Subrahmanyam (2000). In so doing, we first isolate the possible macroeconomic factors based on a-priori expectations and then examine their consistency in explaining the commonality at the individual level, between exchanges within the same country, and across exchanges around the world. Additionally, in an effort to see whether these macroeconomic variables might explain the changes in liquidity commonality in the up versus down market and emerging versus developed markets. Finally, we also explore if seasonality exists in commonality.

Our investigation centers on potential asymmetric reactions to level of market liquidity, level of market return and level of market risk. We also focus on more structural factors such as type of legal system (common vs. civil law), interest rates and market structure. Chordia, Roll, and Subrahmanyam (2001) argue that rate of change in liquidity is different for down and up markets. Chordia, Roll, and Subrahmanyam (2002) show that order imbalances during down and up markets increase the inventory risks and lead to increased transaction costs (de-

creased liquidity). Also, short-selling constraints and margin considerations are more likely to be binding during down market. If there is over-reaction in down markets and under-reaction in up markets, then the commonality should be higher in down markets compared to the up markets. Therefore, we will be evaluating the commonality for down markets and up markets.

In terms of extreme market conditions, we suspect that the traders in emerging markets are more concerned about the downside risk or the possibility of market crashes. Absence of market makers in emerging markets puts an additional liquidity constraint on investors. The higher frequency of large negative returns for emerging markets relative to a lower frequency for developed markets could be considered as another source of investor caution. Measures of trading activity for emerging markets are also lower compared to developed markets which constitute additional trading constraint for investors. Therefore, we will be evaluating the effect of frequency of large negative returns (size of downside risk) on commonality.

In terms of macroeconomic factors, we suspect that the short- and long-term interest rates will influence cost of carrying inventory and in turn affect commonality. Chordia, Roll, Subrahmanyam (2001) show the effect of interest rates on market liquidity and trading activity. For periods with unbalanced inventories, dealers need to finance the cost of inventory. If these periods coincide with high periods of short-term interest rates, the inventory cost increases. Therefore, we will be evaluating the effect of short-term interest rates on level of commonality.

While it is expected that developed markets should have influence over the liquidity of emerging market, we suspect that there should be commonality in liquidity between markets as well. Lee (2005) provides evidence for the effect of U.S. equity markets on liquidity risk of international markets. This evidence implies that the common factors in determinants of indi-

vidual (and market) liquidity within a single market may have commonality between markets. The reason for such commonality may be the contagion effect as well as the competition between markets for liquidity or for international investors. Therefore, we will be evaluating the different levels of commonality between markets.

Seasonality in returns may disappear after being documented. This is largely because these patterns provide opportunities for investors to profit. Draper and Paudyal (1997) provide evidence for the existence of seasonality in London Stock Exchange for liquidity. Chordia, Roll, Subrahmanyam (2001) also provide evidence for seasonality in liquidity and trading activity. Admati and Pfleiderer (1988) and Chowdhry and Nanda (1991) argue that return anomalies have a tendency to disappear after being documented due to arbitrage opportunities, whereas traders are likely to become more cautious against liquidity anomalies making them persistent and larger. In order to account for any possible seasonality effects in our analysis, we examine the effect of existence of seasonal patterns on commonality in liquidity.

In sum, our main contribution is towards the understanding of factors affecting the level of commonality for equity markets and the likelihood of stocks to have commonality. More specifically, we examine whether commonality in liquidity varies across up and down markets, whether it depends on the magnitude of downside risk, whether it depends on financing costs and whether it is seasonal. We also include more liquidity measures (and different market averaging for these measures) than a typical liquidity study which is important since liquidity arguably has many dimensions. Moreover, while we employ Chordia, Roll, and Subrahmanyam (2000) empirical model, we also include a panel regression for each equity market to test overall significance of commonality in liquidity. Finally, but not the least important, we compare developed markets and emerging markets. There are relatively few studies on emerging

markets and they are likely to have lower levels of liquidity as history shows. Their liquidity sometimes vanishes, perhaps due to their small sizes and lack of transparencies.

While our initial estimation methodology for commonality in liquidity follows Chordia, Roll, and Subrahmanyam (2000) like most other literature, our extensions are unique. To our knowledge, our study is the first study to evaluate idiosyncratic factors as well as market (and country) factors as possible reasons for companies to have commonality.

We start our analysis with a summary of previous literature for liquidity as well as commonality in liquidity. Since, it is argued that individual stocks' liquidity co-moves with the market liquidity due to idiosyncratic as well as market factors, we will discuss underlying theories. In the third section, we describe the variables used in estimations and present the econometric design. The fourth section presents the hypotheses tested, supporting arguments and our expectations. Data is described within the fifth section along with summary statistics. The sixth section presents empirical results of each test with discussion of implication from the results. Concluding remarks are at the seventh section. Appendices explain the steps for preparing the data.

Previous literature

Liquidity of an individual stock

Liquidity of an individual security refers to the speed and the cost of trading. There is no perfect measure of liquidity yet, however there are several proxies defined by the previous studies including spread[1] (i.e. Amihud and Mendelson, 1986; Chordia, Roll and Subrahmanyam, 2001; Huberman and Halka, 2001; Eleswarapu, 1997), effective spread[2] (i.e. Chalmers and Kadlec, 1998; Chordia, Roll and Subrahmanyam, 2001) and depth[3] (i.e. Huberman and Halka, 2001). These proxies are calculated using high frequency data for each transaction during any trading day. Unfortunately, availability of such data is limited. Amihud (2002) argues that the daily price response to trading volume[4] could be used as a liquidity proxy. This measure does not require transaction data and commonly available closing prices and dollar volume will suffice.

Previous literature examines the determinants of individual liquidity. These include individual trading volume, volatility, share price (Benston and Hagerman, 1974; Stoll, 1978), inventory risk of market makers (or dealers) (Stoll, 1978; Amihud and Mendelson, 1980, 1982; Ho and Stoll, 1981; O'Hara and Oldfield, 1986; Grossman and Miller, 1988), asymmetric information (Copeland and Galai, 1983; Glosten and Milgrom, 1985; Easley and O'Hara, 1987; Kyle, 1985; Admati and Pfleiderer, 1988; Lesmond, Ogden and Trzcinka, 1999; Easley, Hvidkjaer, and O'Hara, 2002), differences in market microstructure (Affleck-Graves et. al., 1994; Garbade and

[1] Difference between the bid and ask prices.
[2] Absolute difference between the actual traded price and average of the quoted bid and ask price.
[3] Total of number of securities offered at the ask price and at the bid price.
[4] Average of the daily ratio of absolute return to the dollar volume for a stock.

Silber, 1979; Madhavan, 1992; Jain, 2002) and global economic integration (Lee, 2005). Tinic (1972) and Menyah and Paudyal (1996) argue that the institutional ownership and multiple listings are also determinants of liquidity.

If the trading volume for a share increases, it reduces the inventory risk of the dealer and leads to reduced transaction costs. If, however, the volatility of the share price increases then the risk of holding any inventory will increase and will drive the transaction costs higher. Higher share prices will increase the cost of holding inventory for the dealers. On the other hand, high priced securities will have proportionally lower fixed costs. Overall, high priced shares appear to have lower transaction costs. The market makers (or dealers) will, during the trading day, carry inventories. They have to decide how long they will carry their positions. Based on their expectations, they will change the bid and ask prices to balance their inventory levels. Skewness of their prices indicates their intentions. Apart from rebalancing inventory, changing spreads also helps dealers to alter the speed of turnover. While they do not have the total control over the turnover, through spread they exert influence over the speed of turnover. In any given trade, the dealer has the potential to earn from the trades of the uninformed traders. Traders with superior information will be able to time the market at the dealer's expense. The dealer will change his speed of turnover according to severity of asymmetric information. Dealers with market making responsibilities will not be as flexible in their trading decisions as high volume investors in auction markets. After all, market makers are bound to provide liquidity. Finally, liquidity providers will watch other integrated markets. For instance, if the transaction costs in the U.S. market increases, other markets might follow.

Earlier studies[5] of liquidity concentrated on individual equity liquidity, its determinants and especially its relationship with security returns (i.e. Amihud and Mendelson, 1986; Karpoff, 1987; Hiemstra and Jones, 1994; Eleswarapu, 1997; Jacoby, Fowler, and Gottesman, 2000). Individual liquidity studies are focused on transaction costs and its determinants. They are asking the question of whether individual trading volume, volatility, share price, inventory cost etc. affect the equity return.

Liquidity of a market

Liquidity of a market refers to the ability of market participants to transact large amounts without creating a market-wide impact. Large amounts are defined according to the trading activity measures such as volume or number of transactions. Similar to measure of liquidity for individual securities, measure of liquidity for a market is also not clearly defined. Several proxies exist including average illiquidity in the market (Amihud, 2002), number of traded shares in the market (Gibson and Mougeot, 2004), proportion of zero daily firm returns (Lesmond, 2002; Bekaert, Harvey and Lundblat, 2003) and market turnover (Atje and Jovanovic, 1993; Bekaert and Harvey, 1997; Levine and Zervos, 1998). Use of averaged individual security liquidity proxies as a market liquidity proxy is also common. Except for the averaged individual liquidity proxies, the variables needed for market liquidity proxies are available for many markets as long as the data frequency is at least daily.

Market liquidity studies (i.e. Amihud, 2002; Bekaert, Harvey and Lundblat, 2003; Pastor and Stambaugh, 2003; Gibson and Mougeot, 2004; Martinez, Nieto, Rubio and Tapia, 2005; Lee, 2005) focus on the question of whether market-wide factors of liquidity affect the equity price. Starting with Chordia, Roll, and Subrahmanyam (2000), Huberman and Halka (2001) and

[5] Lo, Mamaysky and Wang (2001) and Madhavan (2000) provide surveys of earlier liquidity studies

Hasbrouck and Seppi (2001), the question is whether individual stocks' liquidity covaries with or determined by market liquidity. The evidence of covariance between individual liquidity and market liquidity is extended by Acharya and Pedersen (2005) to evaluate it as a factor in asset pricing.

Commonality in liquidity

Commonality in liquidity refers to the extent of market-wide (or industry-wide) liquidity affecting the liquidity of individual equities. In other words, along with many other determinants of liquidity, change in market-wide liquidity is another determinant of individual stock liquidity. Each stock has its own *sensitivity to commonality* (Huberman and Halka, 2001; Hasbrouck and Seppi, 2001; Chordia, Roll, and Subrahmanyam, 2000). Commonality in liquidity is referred to as the new non-diversifiable risk that needs to be priced. Acharya and Pedersen (2005) analyze commonality in liquidity and argue that the commonality is a priced risk. The analysis of commonality as a determinant of individual equity liquidity is relatively new.

Chordia, Roll, and Subrahmanyam (2000) explain the reasons for the existence of commonality in liquidity. Informed traders could have an influence on the transaction costs of individual stocks, if their information is specific to a stock. In case of information that would pertain to the whole market (or industry), informed traders' behavior will show a similar pattern. Under such circumstances, market makers will change transaction costs for many stocks. News with positive expected effect on prices will lead to buy orders and news with negative expected effect will lead to sell orders. Depending on the scope of the news, the size of the order and the burden on the inventory will be determined. This will cause a commonality in transaction costs. Accordingly, if the market makers' inventory risk increases, so will the cost of holding (or turning over) the inventory. Volatility of individual stocks will increase the inventory

risk. Since there is commonality in individual stocks' volatility, we can expect to have commonality in dealer inventories' risk and in turn, in transaction costs.

Previous return-individual liquidity studies do not consider commonality in liquidity. On the other hand, previous return-market liquidity studies do not consider changes in individual stocks' liquidity. Acharya and Pedersen (2005) examine whether each stock's liquidity has a different sensitivity to market liquidity and whether level of sensitivity is a priced factor. Thus, with the analysis of liquidity sensitivity, Acharya and Pedersen (2005) are able to integrate individual as well as market liquidity in asset pricing. Their analysis also considers the relationship between individual returns and market liquidity as well as the relationship between individual liquidity and market return.

Chordia, Roll, Subrahmanyam (2001) evaluate the determinants of liquidity and trading activity. They provide evidence that market returns, market volatility, market movements, macroeconomic determinants such as interest rates, and some known seasonality effects such as day-of-the-week and holidays effect liquidity and trading activity. In terms of the market movements, they also provide evidence for difference in transaction costs in down and up markets. They show that the liquidity is decreased at down markets more than it increases in up markets. Intuitively, dealers are more cautious during down markets and they reduce their speed of turnover by increasing the spreads. This is probably due to the chance of further decline or overall market crash. In terms of the up market, dealers would be willing to decrease the spreads in an attempt to increase the speed of turnover however they are still cautious of price reversals, mean reversions, market-wide corrective trading or profit realizations. Chordia, Roll, Subrahmanyam (2002) evaluate the difference between down and up markets further in terms of order imbalances. As long as there is an order imbalance, it will be harder for dealers

to balance their inventories and they in turn increase transaction costs. If the inventory risk increases, order imbalance will contribute to accumulation (or depletion) of inventory which will be costly for the dealers. Accordingly, such risk is higher for down markets than for up markets.

Effect of macroeconomic factors on liquidity

Chordia, Roll, Subrahmanyam (2001) provide evidence for short-and long-term interest rates as factors for market-wide liquidity. They acknowledge that there is no study about the time variant nature of market-wide liquidity. Therefore, their evidence is the first to show that macroeconomic factors have influence on equity market liquidities. Along with interest rates, they also evaluate macroeconomic announcements. Their finding of increased depth and trading activity provides basis for the previous explanations about market wide asymmetric information.

The emphasis of previous studies in terms of time variance in liquidity was on the individual liquidity. Lee et. al. (1993) examines changes in liquidity around earnings reports, Koski (1996) around dividend announcements, Desai et. al. (1998) around stock splits and Foster and Viswanathan (1995) around take-over announcements. Caballe and Krishnan (1994) extend Foster and Viswanathan (1995) to evaluate the covariance of liquidities of two stocks around event dates.

Jain (2002) evaluates market structures of different countries and liquidity. He shows that the trading design in equity markets has an effect on market-wide liquidity. Affleck-Graves, Hegde and Miller (1994) shows that inventory cost of specialist markets is larger compared to dealer markets. More recently, Galariotis and Giouvris (2007) evaluates the effect of changes

in trading regimes on commonality of liquidity in London Stock Exchange. They conclude that the commonality in liquidity is similar for alternate trading regimes.

Amihud, Mendelson, and Wood (1990) evaluate market-wide liquidity around the financial crisis of October, 1987. They find that the decrease in liquidity was significant. This evidence implies that before and during a financial crisis, the market reacts by increasing transaction costs. The market-wide reaction to such an event shows that the commonality in liquidity may in fact plays a role as a cause or a predictor of large market episodes.

Seasonality of liquidity

There is considerable literature about seasonality of individual liquidity as well as market liquidity. Pettengill and Jordan (1988) is one of the earlier studies that examine seasonality of volume, a measure of trading activity. Fortin, Grube, and Joy (1989) show that transaction costs increase later in a year in Nasdaq. They also find that the highest transaction costs are during December. Clark, McConnell and Singh (1992) show that the increased transaction costs in December is towards the end of the month and they decrease at the end of the following January. Lakonishok and Maberly (1990) evaluate day-of-the-week effect and find that individuals have the tendency to sell on Mondays more than any other week day. Analyzing daily data, Foster and Viswanathan (1993), find that the transaction costs are higher on Mondays due to higher adverse selection costs and lower trading volume. Analyzing intraday data, Foster and Viswanathan (1993) find higher transaction costs due to higher adverse selection costs and volatility in first half an hour of trading day. Lockwood and Linn (1990) also find higher volatility in the earlier hours of trading. Mclnish and Wood (1992) show that the transaction costs are higher at the market open decrease in the afternoon, and increase towards the last hours of trading. Wei (1992) decomposes the spread into components related to asymmetric

information and inventory. Utilizing U.S. data, he finds a U-shaped pattern for the asymmetric component of the spread and inverted U-shaped pattern for the inventory component. Draper and Paudyal (1997) provide evidence for seasonality patterns in London Stock Exchange. Persistence of anomalies in liquidity is suggested by Admati and Pfleiderer (1988) and Chowdhry and Nanda (1991). They emphasize the point that return anomalies has a tendency to disappear after being documented due to arbitrage opportunities. However, traders become more cautious against liquidity anomalies making them persistent and larger.

International evidence

Liquidity and the relationship between liquidity and returns are well documented for international markets (i.e. Harvey, 1995; Bekaert, 1995; Domowitz, Glen, and Madhavan, 2001; Lee, 2005). For the emerging markets Bekaert, Harvey and Lundblat (2003) examine the market liquidity as a determinant of equity returns. Existence of commonality is also documented for U.S. and for some of the international markets. Domowitz and Wang (2002) and Fabre and Frino (2004) examine the Australian market. Friederich and Payne (2002) and Galariotis and Giouvris (2007) analyze the British market. They provide evidence of the existence of commonality in liquidity. Brockman, Chung and Perignon (2008) provide the most extensive evidence of commonality by evaluating 38 countries. They show that commonality exist within these markets as well as between markets.

Our contribution to current literature

Commonality is the sensitivity of each stock's liquidity to the market liquidity. The liquidity beta is very similar to the well known return beta. The liquidity beta shows how a company's liquidity reacts to new information above and beyond the market. *Our aim is to evaluate dif-*

ferent factors that change the likelihood of stocks to have statistically significant liquidity betas and factors that change the percentage of companies within each equity market with statistically significant liquidity betas. For the return beta, previous literature is mainly concerned with the implication for asset pricing models. However for the liquidity beta, we need to analyze the factors affecting the level for two reasons. First, market liquidity crashes start with individual company liquidity crashes. For a market to crash, it must have an increased number of companies with sensitivity to market liquidity. Therefore, analysis of factors that increase or decrease the level of commonality in liquidity will enable us to understand the channels in which markets go through (or initiate) liquidity crises. Second, there is a negative correlation between liquidity and return. This is to say that the illiquidity of a stock is compensated. Diversified portfolios are able to minimize such risk. Their only exposure is the market liquidity. However, each stock's sensitivity to market liquidity will have an impact on asset pricing model. An analysis of factors for the extent of liquidity sensitivity will allow us to evaluate portfolio rebalancing.

To our knowledge, the factors affecting the extent of commonality for individual stocks and for equity markets have not received sufficient attention. With a comparative approach, and relatively large sample, differences in commonality between stocks and markets will be identified. This will enable us to explore factors causing such differences and contribute to the understanding of possible sources of commonality and pricing of commonality. Understanding the factors affecting commonality will contribute to the literature for asset pricing, market microstructure and liquidity. Considering the importance of liquidity for emerging markets and reoccurrences of liquidity crises, commonality in liquidity also has implications for the literature for financial crashes.

Variables and econometric design

With any study that includes emerging markets, one of the concerns is the data limitation. Bekaert, Harvey, Lundblad (2003) states that the data is usually in poor quality for these markets. Transaction data that is available for some of the developed markets is either not available or only available for short periods of time. Brockman, Chung and Perignon (2008) evaluate 47 stock exchanges in 38 countries for the 2002 and 2004 period using trade and quote data. On the other hand, Lee (2005) examines 48 countries using daily data for the 1988 and 2004 period. He finds that the zero-return measure suggested by Lesmond, Ogden and Trzcinka (1999) is highly correlated with more accurate liquidity proxies such as bid and ask spread for developed markets where transaction data is available.

Acharya and Pedersen (2005) study the covariance between individual stock return and market liquidity, the covariance between individual stock liquidity and market liquidity as well as covariance between individual stock liquidity and market liquidity. It is this last covariance that we will follow Acharya and Pedersen (2005) in this analysis. Their purpose is to estimate an asset pricing model with liquidity risk consideration. Our aim is to compare liquidity sensitivities in emerging and developed markets. Lee (2005), using the zero-return liquidity measure, shows that the asset pricing model with liquidity risk suggested by Acharya and Pedersen (2005) does not hold for international markets. Our interest, however, is focused on the covariance of individual liquidity sensitivities to local market liquidity and with international market liquidities.

In terms of the data for the study, our focus is on the daily liquidity of individual securities and overall market liquidity. Therefore, we will be using a liquidity measure for individual se-

curities that is based on daily data. Cooper, Goth and Avera (1985), Khan and Baker (1993) and Amihud, Mendelson and Lauterbach (1997) suggest the ratio of daily volume to absolute return. This measure is the required trade volume in dollars for a 1% return. A high (low) ratio means that the price impact of large trades is small (large). Thus, high ratio means that the individual stock's liquidity (or depth) is high.

Amihud (2002) suggests an illiquidity measure that is related to the Amivest liquidity measure described above. The illiquidity measure is the average of ratio of absolute return to daily volume. Amihud (2002) averages the ratio for each year for an annual liquidity measure. Accordingly, using larger periods of time will result in more reliable illiquidity ratios. However, in order to have a more reliable measure, we need to sacrifice data frequency. While Amivest and Amihud measures are more common for liquidity studies covering international markets, commonality studies mostly use transaction data.

Our data is provided by Reuters through "QuoteCenter" application via Equis International[6]. After our filters, the final dataset includes 36,457 stocks traded on 46 stock exchanges in 33 countries. The earliest observation (of all countries) is January, 2000 and the latest is January, 2008. Variables for the end-of-day data include; date, last sale, open, high, low, bid, ask and volume. Thus, we are able to adopt more reliable liquidity measure such as quoted spread, proportional quoted spread, effective spread, proportional effective spread and percentage spread.

[6] http://www.equis.com/

Variables for individual stocks

In this section we define each variable used in the econometric analysis for individual stocks.

The daily return (*R*) is calculated as follows;

$$R_{c,i,t} = \frac{ACP_{c,i,t} - ACP_{c,i,t-1}}{ACP_{c,i,t-1}}$$

where *t* refers to each trading day, *c* refers to exchange, *i* refers to individual stocks and *ACP* refers to adjusted last sale price.

In the equations for liquidities, *t* refers to each trading day, *c* refers to exchange and *i* refers to individual stocks. Thus, we calculate these variables for each trading day for each stock in each equity exchange.

Spread (*S*) is calculated as follows;

$$S_{c,i,t} = Ask_{c,i,t} - Bid_{c,i,t}$$

and *change in spread* (*%S*) is calculated as follows;

$$\%S_{c,i,t} = \frac{S_{c,i,t} - S_{c,i,t-1}}{S_{c,i,t-1}}$$

and *first difference of spread* (*ΔS*) is calculated as follows;

$$\Delta S_{c,i,t} = S_{c,i,t} - S_{c,i,t-1}$$

Effective and proportional spreads are calculated using the middle point of the bid and ask prices. The *mid-quote* (*MQ*) is calculates as follows;

$$MQ_{c,i,t} = \frac{\left(Bid_{c,i,t} + Ask_{c,i,t}\right)}{2}$$

Effective spread (*ES*) is calculated as follows;

$$ES_{c,i,t} = 2\left|ACP_{c,i,t} - MQ_{c,i,t}\right|$$

and *first difference of effective spread* (*ΔES*) is calculated as follows;

$$\Delta ES_{c,i,t} = ES_{c,i,t} - ES_{c,i,t-1}$$

Proportional spread (*PS*) is calculated as follows;

$$PS_{c,i,t} = \frac{S_{c,i,t}}{MQ_{c,i,t}}$$

and *first difference of proportional spread* (*ΔPS*) is calculated as follows;

$$\Delta PS_{c,i,t} = PS_{c,i,t} - PS_{c,i,t-1}$$

Proportional effective spread (*PE*) is calculated as follows;

$$PES_{c,i,t} = \frac{\mathrm{ES}_{c,i,t}}{ACP_{c,i,t}}$$

and *first difference of proportional effective spread* (*ΔPE*) is calculated as follows;

$$\Delta PES_{c,i,t} = PES_{c,i,t} - PES_{c,i,t-1}$$

Percentage spread (*PR*) is calculated as follows;

$$PRS_{c,i,t} = \frac{S_{c,i,t}}{ACP_{c,i,t}}$$

and *first difference of percentage spread* (*ΔPR*) is calculated as follows;

$$\Delta PRS_{c,i,t} = PRS_{c,i,t} - PRS_{c,i,t-1}$$

Variables for markets

In our estimations, we will be using averages of individual liquidity measures. We will follow the previous studies for liquidity (i.e. Amihud, 2002) and commonality in liquidity (i.e. Chordia, Roll, and Subrahmanyam, 2000) and use equally weighted market averages. However, beginning with Chordia, Roll, and Subrahmanyam (2000), previous literature provide evidence of size being an important consideration for commonality studies. Thus, along with equally weighted market variables, we will also use value weighted market variables.

Lesmond, Ogden and Trzcinka (1999) argue that for a trade to occur transaction costs need to be less than the value of information signal. If this is not the case then a transaction may not occur. This argument lays the foundation for the zero-return measure. Lesmond (2002) and Bekaert, Harvey and Lundblat (2003) suggest that proportion of zero daily firm returns is a reliable proxy for market illiquidity. They find that the zero measure has 67% positive correlation with the bid-ask spread for countries where data is available. Lee (2005) also finds that the zero-return measure is highly correlated with more accurate liquidity proxies. Thus, we will be using the average of spread, average of effective spread, average of proportional spread, average of proportional effective spread and average of percentage spread.

In the equations for market variables, *t* refers to each trading day, *c* refers to exchange, *i* refers to individual stocks and *ns* refers to number of traded stocks during any trading day. Thus, we calculate these variables for each trading day for each stock in each equity exchange.

In order to obtain the number of *different stocks traded* (*ns*) within a country for each trading day, we count the number of adjusted closing prices for each trading day. *Total market capitalization* (*TMC*) is calculated as follows;

$$TMC_{c,t} = \sum_{i=1}^{ns_{c,t}} MC_{c,i,t}$$

Equally weighted market return (*EWMR*) is calculated as follows;

$$EWMR_{c,t} = \frac{\sum_{i=1}^{ns_{c,t}} R_{c,i,t}}{ns_{c,t}}$$

and *value weighted market return* (*VWMR*) is calculated as follows;

$$VWMR_{c,t} = \sum_{i=1}^{ns_{c,t}} R_{c,i,t} \frac{MC_{c,i,t}}{TMC_{c,t}}$$

Equally weighted change in market liquidity (*EWMΔL*) (*EWM%L* is used for the percentage change in spread) is calculated as follows;

$$EWM\Delta L_{c,t} = \frac{\sum_{i=1}^{ns_{c,t}} \Delta \mathrm{L}_{c,i,t}}{ns_{c,t}}$$

Value weighted change in market liquidity (*VWMΔL*) (*EWM%L* is used for the percentage change in spread) is calculated as follows;

$$VWM\Delta S_{c,t} = \sum_{i=1}^{ns_{c,t}} \Delta L_{c,i,t} \frac{MC_{c,i,t}}{TMC_{c,t}}$$

where liquidity refers to spread, effective spread, proportional spread, proportional effective spread and percentage spread.

For the calculation of market variables, we also follow the previous literature and calculate a different market variable for each stock for each day by excluding the stock itself from the market. Thus, when we are regressing the change in liquidity for an individual stock on market average change in liquidity, market average liquidity calculation does not include the particular stock. Thus, for each market variable, we will include a subscript of *i* to indicate that the market average variable does not include the stock *i*.

Estimation of commonality in liquidity for individual stocks

Using percentage change for liquidity measures

We will be following Chordia, Roll, and Subrahmanyam (2000) for the liquidity commonality. Their approach is a market model of individual liquidity and market liquidity. This methodology became common among liquidity commonality studies. The equation used by Chordia, Roll, and Subrahmanyam (2000) is as follows;

$$\begin{aligned}\%S_{i,t,c} = \alpha_{i,c} &+ \beta_{1,i,c}EWM\%S_{i,t,c} + \beta_{2,i,c}EWM\%S_{i,t+1,c} + \beta_{3,i,c}EWM\%S_{i,t-1,c} \\ &+ \beta_{4,i,c}EWMR_{i,t,c} + \beta_{5,i,c}EWMR_{i,t+1,c} + \beta_{6,i,c}EWMR_{i,t-1,c} + \beta_{7,i,c}\Delta R^2_{i,t,c} \\ &+ \varepsilon_{i,t,c}\end{aligned}$$

Equation 1: Percentage change in spread is regressed on equally weighted average of percentage change in spread for the market and equally weighted market return.

In this equation ΔR^2 refers to the change in squared return to capture return volatility. The coefficient for the contemporaneous change in market liquidity is the sensitivity of stock's

change in liquidity to the change in market liquidity. Market return is included to capture any correlations between change in stock's liquidity and market return.

We expect to have some level of commonality in each equity market. Based on the evidence presented in previous literature, we expect countries to have different levels of commonality.

The evidence presented in previous studies points to size as one of underlying factors for consideration for commonality in liquidity. Our test incorporates the effect of size by replacing the equally weighted market variables in Equation 1 with value weighted market variables.

$$\begin{aligned}\%S_{i,t,c} = \alpha_{i,c} &+ \beta_{1,i,c} VWM\%S_{i,t,c} + \beta_{2,i,c} VWM\%S_{i,t+1,c} + \beta_{3,i,c} VWM\%S_{i,t-1,c} \\ &+ \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} \\ &+ \varepsilon_{i,t,c}\end{aligned}$$

Equation 2: Percentage change in spread is regressed on value weighted average of percentage change in spread for the market and value weighted market return.

Based on the suggestions of size as a factor for commonality, we expect to see different levels of commonality (for each equity market) with value weighted liquidity measures. The differences will be due to average company size within each equity market.

Using first difference for liquidity measures

We note that liquidity measures for individual stocks as well as market have relatively high variance. Thus, using percentage change may bias our results. This is especially the case for equity markets where infrequent trading is of a concern. Days with low spreads (high liquidity) may be followed by days with high spreads (low liquidity). While positive increase in percen-

tage change in spreads can be more than 100% (i.e. 10 cents spread increasing to 30 cents is 200%), the downside can never be more than or equal to negative 100% (i.e. 30 cents spread decreasing to 10 cents is -67%). We note that as the frequency of such liquidity reversal increase, the possibility of bias increases. While this may not be much of an issue for most liquid markets such as NYSE, such bias is expected to have impact on commonality tests for not so liquid markets. Since our study includes markets of various liquidity levels, we will check to see if this bias has any impact on commonality results for all markets.

We first test the Equation 1 for the impact of this potential bias by replacing the percentage change in liquidity measures with first difference of liquidity measure.

$$\Delta S_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} EWM\Delta S_{i,t,c} + \beta_{2,i,c} EWM\Delta S_{i,t+1,c} + \beta_{3,i,c} EWM\Delta S_{i,t-1,c} + \beta_{4,i,c} EWMR_{i,t,c} + \beta_{5,i,c} EWMR_{i,t+1,c} + \beta_{6,i,c} EWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 3: First difference of spread is regressed on equally weighted average of first difference of spread for the market and equally weighted market return.

We also test the Equation 2 for the impact of the said bias by replacing the percentage change in liquidity measures with first difference of liquidity measure.

$$\Delta S_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta S_{i,t,c} + \beta_{2,i,c} VWM\Delta S_{i,t+1,c} + \beta_{3,i,c} VWM\Delta S_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 4: First difference of spread is regressed on value weighted average of first difference of spread for the market and value weighted market return.

For Equation 3 and Equation 4, we expect to see different results compared to Equation 1 and Equation 2 respectively. The bias should not necessarily result in lower (or higher) levels of commonality. The bias is in the liquidity measure's change from time t to t+1. We simply argue that such bias could have impact on commonality estimations (or any liquidity study). However, we expect that the difference in level of commonality between estimations using percentage change and first difference should be lower for most liquid equity markets. The difference should be more visible for lower liquidity markets (where variance of daily liquidity is high).

For further tests of commonality, we will be using Equation 4 as our base model in which we test first difference of liquidity measure with value weighted market variables.

Controlling for day-of-the-week effect

In order to test for the impact of day-of-the-week effect on commonality in liquidity, we include four daily dummies to Equation 4.

$$\begin{aligned}\Delta S_{i,t,c} = \alpha_{i,c} &+ \beta_{1,i,c} VWM\Delta S_{i,t,c} + \beta_{2,i,c} VWM\Delta S_{i,t+1,c} + \beta_{3,i,c} VWM\Delta S_{i,t-1,c} \\ &+ \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} \\ &+ \beta_{8,i,c} D_{1,i,t,c} + \beta_{9,i,c} D_{2,i,t,c} + \beta_{10,i,c} D_{4,i,t,c} + \beta_{11,i,c} D_{5,i,t,c} + \varepsilon_{i,t,c}\end{aligned}$$

Equation 5: First difference of spread is regressed on value weighted average of first difference of spread for the market, value weighted market return and four daily dummies.

In this equation, D_1 is a dummy variable which equals to 1 if the day is a Monday. D_2 is the dummy variable for Tuesday. D_4 is the dummy variable for Thursday. D_5 is the dummy variable for Friday. While it is suggested in previous literature that there may be persistent day-of-the-week effect for liquidity, we do not expect to see much change in commonality levels between different weekdays. While liquidity levels may change for different days, stocks' change in li-

quidity sensitivity is not expected to be any different on different weekdays. However, day-of-the-week effect in liquidity is reported in earlier literature, it is reported to be persistent and more common in emerging markets (or less liquid markets), we would like to test for its effect on our further examination of commonality factors. In case of no change in commonality levels, we will not be including them in our further tests.

Controlling for market direction

With this hypothesis we are examining whether the proportion of statistically significant liquidity sensitivity betas within the market is the same in down and up markets. The discussion about the underlying sources of commonality emphasized on inventory cost and asymmetric information explanations. For the dealer markets, inventory cost is borne by the market makers. For the auction markets, any trader carrying a large intraday volume will bear some inventory cost. Market makers will caution themselves against any adverse market movements. As long as their goal is to have turnover and to earn bid-ask spread, keeping high inventory levels is undesirable. Any order imbalance will eventually distract inventory balance and lead to increased transaction costs. It is argued by Chordia, Roll, and Subrahmanyam (2001) that change in transaction costs occur in a different rate in down and up markets. This may be explained by the investors' willingness to wait for more profits while the market is increasing and their impatience when there are increasing losses. The difference between the panic state versus patience state leads to order imbalances between down markets and up markets. Also, short-selling constraints and margin considerations are more likely to be binding during down markets.

We define down markets as any trading day with a negative return and up market as any trading day with a non-negative return. In order to test our hypothesis that commonality dif-

fers for down and up markets, we include a dummy variable (*UD*) to Equation 4, which is equal to one if the market is non-negative.

$$\Delta S_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta S_{i,t,c} + \beta_{2,i,c} VWM\Delta S_{i,t+1,c} + \beta_{3,i,c} VWM\Delta S_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \beta_{8,i,c} UD_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 6: First difference of spread is regressed on value weighted average of first difference of spread for the market, value weighted market return and market direction dummy.

The overreaction of investors during down markets leads to order imbalances and therefore leads to increased transaction costs. This increase should have general effect on all shares. Thus the market and the shares that make up the market will have a tendency to move together towards lower liquidity. Thus, we expect the down markets to be characterized with positive liquidity betas that are close to one. On the other hand, the underreaction of investors during up markets also leads to order imbalances. However, the difference of transaction costs due to under- and over-reactions will not be the same. Accordingly, *we expect to have larger commonality (higher proportion of statistically significant liquidity betas) in down markets compared to up markets. We also expect to have higher proportion of positive liquidity betas (and closer to one) in down markets compared to up markets.*

In terms of comparison between emerging and developed markets, market crashes following consistent negative market returns are more common in emerging markets. The increases in transaction costs due to order imbalances are also larger in emerging markets. High market depth and high transaction volume would allow developed markets to have more sustainability. These markets have larger number of participants which may not under- or over-react to

the same extent. The existence of institutional investors in higher numbers and larger stakes in developed markets make them less prone to panic sales. The historic evidence of availability of liquidity (at least compared to emerging markets) also makes developed markets more reliable. For an investor, a down market bears more reasons to panic for emerging markets than it does for developed markets. For the up markets however, the differences may not be as distinct. The main difference between emerging and developed markets would be the short-sale restrictions in emerging markets. These restrictions (where exists) would ensure that there are no panic purchases in up markets with similar motives to panic sales in down markets. Thus, emerging markets, in up markets, would have more reasons to be patient and under-react. Accordingly, *we expect that the emerging markets will have more overreaction in down markets compared to developed markets. They will also have more under-reaction in up markets. Thus, we expect increased commonality in liquidity in down markets especially in emerging markets.*

Controlling for autoregressive component

It is quite common for returns to have autoregressive components. Based on the relationship between return and liquidity, we expect to have autoregressive component in liquidity measures as well. Furthermore, since it is theoretically argued that commonality is due to market-makers' (and investors) inventory concerns or asymmetric information, it is a natural result to see market-makers (or investors) to start the trading day with previous day's inventory and some asymmetric information spillover from previous day. In terms of maker-maker (or investor) behavior in trading, it is also natural to expect relative trading behavior in trading to previous day. In other words, trader would have already established perceptions about specific stocks early in the day based on previous day's trading. In order to test the impact of autore-

gressive components for commonality in liquidity, we include the lag of first difference of spread to Equation 4.

$$\Delta S_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta S_{i,t,c} + \beta_{2,i,c} VWM\Delta S_{i,t+1,c} + \beta_{3,i,c} VWM\Delta S_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \beta_{8,i,c} \Delta S_{i,t-1,c} + \varepsilon_{i,t,c}$$

Equation 7: First difference of spread is regressed on value weighted average of first difference of spread for the market, value weighted market return and lag of first difference of spread.

While we believe that including lagged value of the liquidity measure would improve the reliability of the estimation, considering liquidity has autoregressive component, its effect on commonality should not be considerable. The main argument is the fact that predispositions about stocks' liquidity should be ongoing and could be considered sticky. Thus, we would expect to have certain characteristics of stocks resulting in different trading patterns for market-makers and traders. Thus, their short-term perceptions should not be deterministic in stocks' long term commonality with market liquidity.

Other liquidity measures

While the previous tests were based on the spread, we also estimated commonality using other liquidity measures such as proportional spread, effective spread, proportional effective spread and percentage spread. While related previous literature for commonality in liquidity does not report much different results between different measures of liquidity, we test for commonality for these measures as well for robustness purposes. The following four models are based on Equation 4 with suggested different liquidity measures.

$$\Delta PS_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta PS_{i,t,c} + \beta_{2,i,c} VWM\Delta PS_{i,t+1,c} + \beta_{3,i,c} VWM\Delta PS_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 8: First difference of proportional spread is regressed on value weighted average of first difference of proportional spread for the market and value weighted market return.

$$\Delta ES_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta ES_{i,t,c} + \beta_{2,i,c} VWM\Delta ES_{i,t+1,c} + \beta_{3,i,c} VWM\Delta ES_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 9: First difference of effective spread is regressed on value weighted average of first difference of effective spread for the market and value weighted market return.

$$\Delta PES_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta PES_{i,t,c} + \beta_{2,i,c} VWM\Delta PES_{i,t+1,c} + \beta_{3,i,c} VWM\Delta PES_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 10: First difference of proportional effective spread is regressed on value weighted average of first difference of proportional effective spread for the market and value weighted market return.

$$\Delta PRS_{i,t,c} = \alpha_{i,c} + \beta_{1,i,c} VWM\Delta PRS_{i,t,c} + \beta_{2,i,c} VWM\Delta PRS_{i,t+1,c} + \beta_{3,i,c} VWM\Delta PRS_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + \varepsilon_{i,t,c}$$

Equation 11: First difference of percentage spread is regressed on value weighted average of first difference of percentage spread for the market and value weighted market return.

As in evidence presented in previous literature, we do not expect to have much difference in our results. While there may be some difference in coefficients, we do not expect to have much difference in percentage of companies with statistically significant commonality coefficients.

Robustness check on correlated residuals

As a robustness check we also follow Chordia, Roll, and Subrahmanyam (2000) to check for the independence of residuals (from Equation 4) between stocks. We use the following equation for this independence check;

$$\varepsilon_{i+1,t,c} = \omega_{0,i,c} + \omega_{1,i,c}\varepsilon_{i,t,c} + \delta_{i,t,c}$$

Equation 12: Robustness check for the correlation of residuals between stocks.

In this equation, *i* is a stock and *i+1* is the stock after the i^{th} stock in an ascending alphabetical order. In order to have reliable analysis the residuals from Equation 4 needs to be independent across stocks; which means that $\omega_{1,i,c}$ should be statistically insignificant.

Chordia, Roll, and Subrahmanyam (2000) find very little evidence against such independence. However, we suspect that the independence of residuals will be more of a consideration for emerging markets than it is for developed markets. Therefore, we feel the need to extend this analysis to include cross-sectional correlations of residuals between all possible pair-wise combinations. Thus, we estimate Equation 12 for all possible pair-wise combinations between stocks listed for an exchange. We then calculate the average of absolute value of these correlation coefficients.

Estimating commonality in liquidity for overall market

Above estimations are performed for each stock within each equity market. The results are reported in terms of cross-sectional average of coefficients. We also report results in terms of percentage of stocks with statistically significant commonality coefficient (β_1 in Equation 4). However, there may be cross-sectional individual differences between stocks that may be unobservable. Thus, if we have markets that have clusters of large (or small) companies, our results may be biased. Furthermore, we expect that the level of commonality will not be significant for several of the equity markets. Thus, while we are reporting percentage of stocks with significant commonality coefficients, with a random effects panel regression (using GLS), we are also reporting whether calculated percentage is enough to conclude that the market has statistically significant commonality. The following equation is estimated for this purpose;

$$\Delta S_{i,t,c} = \alpha_c + \beta_{1,i,c} VWM\Delta S_{i,t,c} + \beta_{2,i,c} VWM\Delta S_{i,t+1,c} + \beta_{3,i,c} VWM\Delta S_{i,t-1,c} + \beta_{4,i,c} VWMR_{i,t,c} + \beta_{5,i,c} VWMR_{i,t+1,c} + \beta_{6,i,c} VWMR_{i,t-1,c} + \beta_{7,i,c} \Delta R^2_{i,t,c} + u_{i,c} + \varepsilon_{i,t,c}$$

Equation 13: First difference of spread is regressed on value weighted average of first difference of spread for the market and value weighted market return using random effects panel regression with generalized least squares.

In this equation u is a stock specific shock to the overall intercept and varies between stocks but constant through time. It is assumed that both u and ε are uncorrelated with each other.

Firm specific factors

Possibility of crash (up-down market) for the company

Equity markets with relatively lower liquidity, market makers (and investors) are challenged with infrequent trading as well as high transaction costs. Both of these concerns are coupled with short-sale and margin restrictions during down trends. Thus, it is expected that market participants behave similarly especially during down markets due to increased possibility of crashes. We argue that for companies that have higher possibility of negative returns (or possible crash), investors will be more cautious. This may lead to such stocks' liquidities to deteriorate at a much faster speed than other stocks, thus leading to higher levels of commonality in liquidity.

In order to measure possibility of crash, we use *skewness of daily returns* for individual stocks following Chen, Hoong and Stein (2001) and Jin and Myers (2006). If the distribution of daily returns for a stock is negatively skewed than it means that the number of days with positive returns is higher. If the distribution is positively skewed than it means that the number of days with negative returns is higher. Stocks with high levels of positive skewness of return are considered to be high risk securities. Stocks with high levels of negative skewness of return are considered to be low risk securities. Based on the inventory cost and asymmetric information explanations, an occurrence of frequent negative returns should have an impact on liquidity as well as liquidity sensitivities. The increased expectation for large negative returns through high frequency will lead market makers and large intraday traders to increase transaction costs (decrease liquidity) during down markets as a precaution.

Relative price level of the company

Each equity exchange around the world has a different mean price for listed stocks. There is also variation in range of prices. Most liquidity studies has some sort of filter to eliminate stocks with very low prices. For instance, Chordia, Roll, and Subrahmanyam (2000) eliminates stocks' observations for transactions with prices that are lower than $2. Similar approach is employed by the related literature that follows Chordia, Roll, and Subrahmanyam (2000). It is thus accepted that low priced stocks' behavior differ from behaviors of stocks that are prices around the mean price for the exchange.

For the high priced securities, while the percentage spread may be similar to other stocks, in level terms, transactions costs will be higher. It can also be argued that it would be easier for investors to rebalance their portfolios that contain stocks with average prices. Some investors may have to trade high priced stocks in broken lots which would dramatically increase transaction costs. For the market maker point of view, higher priced stocks would mean higher cost of inventory.

To measure relative price level for each stock, we calculate the mean price for each stock and divide it by the market mean price.

Relative coefficient of variation of the company

Coefficient of variation measures a company's standard deviation of return for each unit of return. It is a comparative measure because it simply shows the actual risk of return for each unit of return. Thus, companies with higher returns for the same risk levels should be preferred by the investors. Coefficient of variation measures level of return and level of return risk concurrently and relatively.

In terms of the commonality in liquidity, companies with similar coefficients of variation should have investors with similar preferences. However, for stocks with very high levels of the measure should have lower investor preference and thus less commonality in liquidity. However, for the stocks with lower levels of the measure should have higher investor preference and thus more commonality in liquidity.

Relative liquidity level of the company

While it seems like, one of the priori for companies to have commonality in liquidity is for them to have liquidity. However, this is not the case. Commonality simply means that any change in their liquidity is explained by changes in market liquidity. It could be that a company that has very high liquidity may be totally immune from the effects of the market in which it is traded. Thus, changes in market liquidity may not affect its own liquidity level. On the other hand, we could have a company that has very low liquidity and it may be very sensitive to market liquidity. Another case could be that both extreme examples may reverse their behavior after their initial response to the change in market liquidity. Their reactions could also be short lasting.

With the relative liquidity level, we are testing to see if high (or low) liquidity stocks are more prone to common liquidity movements in the market. We expect to have more commonality with higher levels of liquidity.

Relative market capitalization of the company

Starting with Chordia, Roll, and Subrahmanyam (2000), larger size is argued to be one of the characteristics of companies with commonality in liquidity. With this variable, we will be testing this hypothesis. However, since our intention is to compare different equity exchanges

around the world, we normalize the market capitalization of each company by dividing it by the total market capitalization of the exchange. While such variable transformation does not affect our analysis between stocks within the same exchange, it makes it possible for us to compare companies in different exchanges by their relative size.

Market level factors

Relative risk level of the exchange

Emerging markets are generally auction markets and do not have market makers with liquidity making requirements. In these markets, large intraday traders and frequent market traders substitute dealers. Absence of market makers in emerging markets is a liquidity constraint for investors. In down markets, investors may not be able to find a counterpart to balance their inventories. This is coupled with the fact that emerging markets have more frequent negative large returns with longer durations. Thus, emerging market traders are more cautious against market downfalls against further declines, circuit breakers (which make inventory balancing impossible) and major market crashes. Such caution may result in over-reactions during down markets which in-turn would result in higher liquidity sensitivities and liquidity premiums. This is one of the major reasons for us to consider comparing emerging markets and developed markets.

The previous hypotheses argue that the market makers in dealer markets and large intraday traders in auction markets will face higher inventory and asymmetric information risks in down markets. The main reason for this is the possibility of market participants to overreact during down markets. The possible overreaction has its roots in increased risk of market crashes (or large negative market crunches) during down markets. The foundation of this ar-

gument lays on the assumption that down markets are more risky. Due to this increased risk investors overreact, liquidity betas increase and therefore more return premiums are paid. Therefore, it leads to the conclusion that if the market risk is higher there should be higher over-reaction, higher increase in liquidity betas and eventually higher premiums are paid. Since the referred risk here is the possibility of large negative returns, we will use the average skewness of returns as our measure for equity market's risk level. This is similar to the discussion about the possibility of crash for individual stocks. For the market, we simply average the skewness of return for all of the stocks in the market.

Legal system of the country

Starting with the seminal paper of LaPorta et. al (1996), it is argued that different legal systems have considerable impact on the equity markets. Due to the high level of investor protection offered in common law countries, equity markets are better developed and highly liquid. International traders, institutional traders and sovereign traders are more prone to invest in equity markets where investor rights are protected. Civil law countries, in comparison, have relatively low level of investor protection.

In terms of commonality in liquidity, we argue that legal systems proxy for institutional trading and possible herding effects suggested by previous literature for commonality. On the other hand, it is also argued that higher investor protection would invite larger investor base and thus result in lower level of commonality.

Short-term interest rates for the country

Market makers and large volume intraday traders have inventories that they carry during any trading day. Market makers are required to provide liquidity. Therefore, they are most

likely to have ongoing inventories carried over other trading days. It is this obligation that makes the inventory costs risky for dealers. For periods with unbalanced inventories, dealers need to finance the cost of inventory. If these periods coincide with high periods of short-term interest rates, the risk of inventory cost becomes costlier. Dealers, in turn, have to pass this on to the investors as increased transaction costs.

Similar logic can be applied to auction market with the exclusion of market making responsibility. However, leveraged transactions and cost of carrying a voluntary inventory (for possible inter-day trading) also expose large traders in auction markets to financing costs. Thus, in either case, as the short-term financing costs increase, cost of carrying an inventory will increase which will lead to lower liquidity in the market.

Increased cost of financing for the inventory is a common cost of the overall market. The cost will change the same for each individual stock's inventory. However, some stocks have higher liquidity betas which make them candidates for inventory imbalances. Thus, these stocks, due to their high liquidity betas, will react to market wide liquidity movements more than others and will make holders of these stocks more susceptible to illiquidity and therefore to requirement to finance their carrying costs. In short, if a stock losses its liquidity more (or faster) (compared to market), then the disposal of such stock will be costly (i.e. less liquidity) which may require the investor to keep it and wait (delay the inevitable or delay until liquidity is restored). The higher cost of financing will be more of a concern for stocks with higher liquidity betas. With the increased concern of higher financing cost, the level of overreaction to market liquidity will increase for stocks with already high liquidity sensitivities. Therefore, the level of short-term financing cost will have an elevating effect on the commonality of liquidity.

On the other hand, for the stocks with lower liquidity sensitivities to market liquidity, increased short-term financing will not have the elevation effect.

Based on the cost of carrying inventory, the risk of loss will increase with the increased financing costs. This will lead to more caution against shares that already have high sensitivities to market liquidity (high liquidity betas). Thus, *we expect that the higher costs of short-term financing will have an elevation effect for the liquidity sensitivities.*

Distribution of company size for the exchange

As discussed in the previous headings, size is an important factor to consider for commonality in liquidity. For the purposes of evaluation between different equity markets, levels of commonality will be affected by the clusters of similarly sized companies in the overall market. The level of commonality is expected to be different between markets where companies are generally larger and markets where companies are generally smaller.

We measure such distribution by the skewness of market capitalization for each equity market. Since larger companies are expected to have higher levels of commonality then negatively skewed markets (market with higher number of larger companies) should be more prone to commonality in liquidity.

Panel logistic estimation for commonality of individual stocks

In order to test the hypotheses discussed in previous section, we estimate a panel logistic regression for all stocks in all equity markets with a panel GLS approach. We initially estimate Equation 4 and create a dummy variable for each stock in our sample. The dummy variable is one if the stock has commonality coefficient with statistical significance level of at least 5%. This commonality coefficient is our dependent variable in the logistic regression. Thus, we are

estimating the impact of the factors explained in the previous section on a stock's likelihood of having commonality in liquidity.

$$CD_i = \alpha + \beta_1 RS_i + \beta_2 RP_i + \beta_3 CV_i + \beta_4 RM_i + \beta_5 SkR_i + \beta_6 SkM_i + \beta_7 Lg_i + \beta_8 MSkR_i + \beta_9 ST_i + \varepsilon_i$$

Equation 14: Logistic estimation to evaluate the impact of idiosyncratic and market factors on likelihood of companies having commonality in liquidity.

In the equation above, for each stock in the sample (for all stocks in all equity markets included in the study), *CD* refers to the commonality dummy variable, *RS* refers to relative spread (mean spread for the stock/cross-sectional mean of stocks' spreads listed in the exchange), *RP* refers to relative price (mean price for the stock/cross-sectional mean of stocks' prices listed in the exchange), *CV* refers to coefficient of variation (standard deviation of return for the stock/mean return for the stock), *RM* refers to relative market capitalization (mean market capitalization for the stock/cross-sectional mean of stocks' market capitalizations listed in the exchange), *SkR* refers to skewness of return (for each stock), *SkM* refers to skewness of market capitalization for the exchange, *Lg* refers to a dummy variable which equals to one if the exchange is in a country governed with common law, *MSkR* refers to average skewness of return for the market and *ST* refers to the short-term interest rates.

Data and descriptive statistics

Data is provided by Reuters through "QuoteCenter" application via Equis International[7]. It includes end-of-day values and fundamental figures for 44 countries for different time periods for 51,897 stock symbols. The earliest observation (of all countries) is August, 1983 and the latest is February, 2008. However, we limit our study to the period between January, 2000 and January, 2008. We employ several filters that are commonly applied in the previous literature. Variables for the end-of-day data include; date, last sale, open, high, low, bid, ask and volume. Fundamental figures include; company name, number of shares outstanding, earnings per share, price to earnings ratio and exchange code.

We initially drop any stock that does not have complete fundamental data and security type information. We require stocks' end-of-day values to have bid and ask prices along with volume and closing price. We drop any observation that does not have any of these variables. We then drop any stock that has fewer than 40 trading days. Delisted, delinquent, watch market, under investigation stocks are also excluded. We also employed security type filters to exclude all ADRs, CDRs, GDRs, ETFs, mutual funds, trusts, investment funds, REITs, CHESS, SDIs and all preferred stocks. In other words, we kept only common and ordinary stocks. If we have an equity market that is left with a few (less than 30) stocks, we exclude the entire market from the study. Since, we will be reporting percentages of companies with commonality, small sample size for each exchange tend to have a magnifying effect.

Chordia, Roll, and Subrahmanyam (2000) exclude observations for which stock's price fall below $2. While we could employ the same filter for U.S. markets, we cannot employ the

[7] http://www.equis.com/

equivalent of $2 rule for all the markets under study. For some of the markets, this would mean to drop average stocks and in some case, considerable portion of the markets. Furthermore, the reasons stated by Chordia, Roll, and Subrahmanyam (2000) do not apply to equity markets where $2 may be relatively more valuable. We consider the $2 as a percentage of mean prices in NYSE. The rule then is altered to exclude any observation (for any of the stocks) where closing price falls below 5% of the equally weighted market price for the day. To eliminate very expensive stocks, we also exclude observations for stocks that have prices that are more than 30 times the equally weighted market price for the day.

In terms of trading days, we calculate average number of stocks for each trading day for each equity market. Then, we average the daily average of traded companies for each exchange. Thus, we obtain the average number of companies traded each day for each exchange. We then exclude any trading days where number of companies traded is less than 20% of the overall average for the exchange.

Finally, after these filters, we eliminate any company that does not have at least 40 observations and any exchange that does not have at least 30 stocks.

In some of the exchanges, there are stocks with different currencies traded (i.e. Singapore, China etc.). We initially treated them as different markets. However, after our filters, they were left with small number of observations and with small number of stocks. They are all excluded from the study.

After our filters, the final dataset includes 36,457 stocks traded on 46 stock exchanges in 33 countries with total market capitalization of about $71.2 trillion. Since we are reporting results for different portfolios, we do not filter the data based on size or volume.

Table 1 provides the list of countries along with (for each country) number of companies, U.S. Dollar equivalent of total market capitalization (cross-sectional sum of mean U.S. Dollar market capitalizations), cross-sectional mean of mean market capitalization ratio (time series mean of daily; market capitalization for the stock / total market capitalization), cross-sectional mean of mean percentage spread, legal system and foreign exchange rate (as of February, 2008). Table 2 provides a similar list of variables for each equity market included in the study.

Descriptive statistics for liquidity measures for their levels are reported in Table 3 through Table 8. To be comparable, these tables are constructed similar to Table 1 (Panel B) in Chordia, Roll, and Subrahmanyam (2000). For each liquidity measure, we report the descriptive statistics (mean, median and standard deviation) for their levels. The descriptive statistics are cross-sectional descriptive statistics on time-series mean liquidity measures across stocks listed in the exchange. Liquidity measure reported include spread, proportional spread, effective spread, proportional effective spread and percentage spread. Table 9 reports the correlation coefficients between these liquidity measures.

Descriptive statistics for daily changes in the liquidity measures are reported in Table 10 through Table 15. For each liquidity measure, we report the descriptive statistics (mean, median and standard deviation) for their daily changes. The descriptive statistics are cross-sectional descriptive statistics on time-series mean change in the liquidity measures across stocks listed in the exchange. Liquidity measure reported include spread, proportional spread, effective spread, proportional effective spread and percentage spread. Table 10 reports the percentage change in spread. First differences of liquidity measures including spread, proportional spread, effective spread, proportional effective spread and percentage spread are reported in Table 11 through Table 15.

Country	Number of stocks	Total market capitalization (USD)	Average market capitalization ratio	Average percentage spread	Legal system	Foreign exchange rate
Australia	2,012	899,000,000,000	0.06%	6.18%	Common	1.1373
Austria	90	70,900,000,000	4.18%	4.84%	Civil	0.6788
Belgium	191	2,780,000,000,000	0.61%	4.26%	Civil	0.6788
Canada	3,088	1,080,000,000,000	0.08%	10.95%	Common	1.008
Chile	125	89,300,000,000	0.90%	9.64%	Civil	470.1
China	1,448	2,210,000,000,000	0.21%	0.21%	Civil	7.225
Denmark	177	153,000,000,000	0.63%	3.19%	Civil	5.0589
Egypt	124	51,000,000,000	1.10%	3.43%	Civil	5.5345
Finland	124	311,000,000,000	0.98%	2.95%	Civil	0.6788
France	786	4,480,000,000,000	0.17%	5.91%	Civil	0.6788
Germany	5,988	15,200,000,000,000	0.18%	5.98%	Civil	0.6788
Greece	332	151,000,000,000	0.40%	1.77%	Civil	0.6788
Hong Kong	1,176	2,300,000,000,000	0.10%	3.63%	Common	7.8098
India	1,559	920,000,000,000	0.19%	3.65%	Common	39.425
Indonesia	311	74,200,000,000	0.39%	8.51%	Civil	9375
Italy	281	3,400,000,000,000	0.70%	0.87%	Civil	0.6788
Japan	3,002	4,500,000,000,000	0.20%	2.29%	Civil	106.75
Jordan	158	17,700,000,000	1.32%	2.84%	Civil	0.7088
Korea	1,734	699,000,000,000	0.16%	0.96%	Civil	949.5
Malaysia	1,064	207,000,000,000	0.11%	3.21%	Common	3.2575
Netherlands	133	1,350,000,000,000	1.17%	3.08%	Civil	0.6788
New Zealand	197	180,000,000,000	0.68%	5.43%	Common	1.2948
Norway	243	431,000,000,000	0.49%	3.62%	Civil	5.4495
Singapore	652	252,000,000,000	0.19%	4.94%	Common	1.4272
South Africa	379	320,000,000,000	0.30%	5.55%	Common	7.0155
Spain	129	1,940,000,000,000	0.95%	1.15%	Civil	0.6788
Sweden	401	464,000,000,000	0.33%	3.33%	Civil	6.4288
Switzerland	332	4,950,000,000,000	0.44%	2.62%	Civil	1.0872
Taiwan	675	516,000,000,000	0.24%	0.90%	Civil	32.31
Thailand	438	118,000,000,000	0.28%	3.53%	Common	31.14
United Kingdom	2,067	1,250,000,000,000	0.15%	7.30%	Common	0.5072
United States	7,041	19,900,000,000,000	0.08%	4.14%	Common	1

Table 1: List of countries along with number of companies, U.S. Dollar equivalent of total market capitalization (cross-sectional sum of mean U.S. Dollar market capitalizations), cross-sectional mean of mean market capitalization ratio (time series mean of daily market capitalization for the stock / total market capitalization), cross-sectional mean of mean percentage spread, legal system and foreign exchange rate (as of February, 2008).

Country	Exchange	Number of stocks	Total market capitalization (USD)	Average market capitalization ratio	Average percentage spread
Australia	Nationall Automated Trading	2,012	899,000,000,000	0.06%	6.18%
Austria	Vienna Stock Exchange	90	70,900,000,000	4.18%	4.84%
Belgium	Euronext Brussels	191	2,780,000,000,000	0.61%	4.26%
Canada	TSX Venture Exchange	2,001	56,300,000,000	0.07%	14.44%
Canada	Toronto Stock Exchange	1,087	1,030,000,000,000	0.10%	4.51%
Chile	Santiago Stock Exchange	125	89,300,000,000	0.90%	9.64%
China	Shanghai Stock Exchange	832	1,920,000,000,000	0.21%	0.22%
China	Shenzhen Stock Exchange	616	296,000,000,000	0.22%	0.20%
Denmark	Copenhagen Stock Exchange	177	153,000,000,000	0.63%	3.19%
Egypt	Cairo Stock Exchange	124	51,000,000,000	1.10%	3.43%
Finland	Helsinki Stock Exchange	124	311,000,000,000	0.98%	2.95%
France	Euronext Paris	786	4,480,000,000,000	0.17%	5.91%
Germany	Berlin Stock Exchange	2,873	3,440,000,000,000	0.09%	6.53%
Germany	Stuttgart Stock Exchange	172	153,000,000,000	1.93%	8.57%
Germany	Munich Stock Exchange	1,728	6,610,000,000,000	0.08%	5.66%
Germany	Frankfurt Stock Exchange	430	994,000,000,000	0.54%	5.73%
Germany	Duesseldorf Stock Exchange	785	3,960,000,000,000	0.17%	4.27%
Greece	Athens Stock Exchange	332	151,000,000,000	0.40%	1.77%
Hong Kong	Hong Kong Stock Exchange	1,176	2,300,000,000,000	0.10%	3.63%
India	Bombay Stock Exchange	1,252	616,000,000,000	0.11%	4.32%
India	Indian National Exchange	307	303,000,000,000	0.52%	0.95%
Indonesia	Jakarta Stock Exchange	311	74,200,000,000	0.39%	8.51%
Italy	Milano Stock Exchange	281	3,400,000,000,000	0.70%	0.87%
Japan	Tokyo Stock Exchange	1,646	3,290,000,000,000	0.10%	1.26%
Japan	Osaka Stock Exchange	407	1,050,000,000,000	0.68%	3.78%
Japan	Japan Securities DAQS	949	154,000,000,000	0.18%	3.44%
Jordan	Amman Financial Market	158	17,700,000,000	1.32%	2.84%
Korea	Korea Stock Exchange	740	562,000,000,000	0.17%	0.94%
Korea	KOSDAQ	994	137,000,000,000	0.15%	0.98%
Malaysia	Kuala Lumpur Stock Exchange	1,064	207,000,000,000	0.11%	3.21%
Netherlands	Euronext Amsterdam	133	1,350,000,000,000	1.17%	3.08%
New Zealand	New Zealand Stock Exchange	197	180,000,000,000	0.68%	5.43%
Norway	Oslo Stock Exchange	243	431,000,000,000	0.49%	3.62%
Singapore	Stock Exchange of Singapore	652	252,000,000,000	0.19%	4.94%
South Africa	Johannesburg Stock Exchange	379	320,000,000,000	0.30%	5.55%
Spain	Barcelona Stock Exchange	129	1,940,000,000,000	0.95%	1.15%
Sweden	Stockholm Stock Exchange	401	464,000,000,000	0.33%	3.33%
Switzerland	CHE SWX Swiss Exchange	332	4,950,000,000,000	0.44%	2.62%
Taiwan	Taiwan Stock Exchange	675	516,000,000,000	0.24%	0.90%
Thailand	Stock Exchange of Thailand (SET)	438	118,000,000,000	0.28%	3.53%
United Kingdom	SETS (Electronic Trading Service)	851	1,090,000,000,000	0.16%	3.42%
United Kingdom	LSE-AIM	1,216	162,000,000,000	0.14%	10.01%
United States	New York Stock Exchange	1,645	10,600,000,000,000	0.07%	0.39%
United States	NASD OTC Bulletin Board	2,134	5,840,000,000,000	0.08%	10.50%
United States	American Stock Exchange	509	113,000,000,000	0.23%	3.75%
United States	Nasdaq	2,753	3,330,000,000,000	0.06%	1.52%

Table 2: List of equity markets along with number of companies, U.S. Dollar equivalent of total market capitalization (cross-sectional sum of mean U.S. Dollar market capitalizations), cross-sectional mean of mean market capitalization ratio (time series mean of daily market capitalization for the stock / total market capitalization), cross-sectional mean of mean percentage spread, legal system and foreign exchange rate (as of February, 2008).

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	0.0419	0.0186	0.1056
Austria	Vienna Stock Exchange	1.0257	0.2874	1.9022
Belgium	Euronext Brussels	2.9883	0.6710	6.3716
Canada	TSX Venture Exchange	0.0714	0.0442	0.1369
Canada	Toronto Stock Exchange	0.1746	0.0829	0.4462
Chile	Santiago Stock Exchange	855.0021	23.4754	7781.1040
China	Shanghai Stock Exchange	0.0148	0.0130	0.0074
China	Shenzhen Stock Exchange	0.0181	0.0135	0.0191
Denmark	Copenhagen Stock Exchange	8.9138	2.2677	30.0206
Egypt	Cairo Stock Exchange	0.9141	0.4461	1.7098
Finland	Helsinki Stock Exchange	0.1822	0.0739	0.4202
France	Euronext Paris	2.3329	0.4866	8.9693
Germany	Berlin Stock Exchange	0.9962	0.4063	7.9654
Germany	Stuttgart Stock Exchange	2.8503	0.3566	23.8934
Germany	Munich Stock Exchange	1.1482	0.5182	4.3343
Germany	Frankfurt Stock Exchange	2.2430	0.4073	9.4515
Germany	Duesseldorf Stock Exchange	0.7858	0.3612	1.9923
Greece	Athens Stock Exchange	0.0606	0.0380	0.1277
Hong Kong	Hong Kong Stock Exchange	0.0768	0.0228	0.4384
India	Bombay Stock Exchange	2.6112	1.1140	7.2029
India	Indian National Exchange	1.3006	0.6381	2.0917
Indonesia	Jakarta Stock Exchange	77.1321	16.4397	276.8872
Italy	Milano Stock Exchange	0.0678	0.0263	0.1183
Japan	Tokyo Stock Exchange	504.3653	9.2745	1443.8670
Japan	Osaka Stock Exchange	61.3410	12.0554	272.7260
Japan	Japan Securities DAQS	542.5726	20.6055	1367.9640
Jordan	Amman Financial Market	0.0724	0.0405	0.0810
Korea	Korea Stock Exchange	138.4268	58.5517	351.6011
Korea	KOSDAQ	61.7768	26.5637	144.6103
Malaysia	Kuala Lumpur Stock Exchange	0.0307	0.0199	0.0438
Netherlands	Euronext Amsterdam	0.4920	0.1128	1.2532
New Zealand	New Zealand Stock Exchange	0.0866	0.0392	0.1581
Norway	Oslo Stock Exchange	2.7066	0.6521	11.7619
Singapore	Stock Exchange of Singapore	0.0138	0.0083	0.0297
South Africa	Johannesburg Stock Exchange	48.6647	13.4918	148.5431
Spain	Barcelona Stock Exchange	0.1245	0.0482	0.1845
Sweden	Stockholm Stock Exchange	1.0309	0.5055	2.1663
Switzerland	CHE SWX Swiss Exchange	6.2287	1.2637	19.1868
Taiwan	Taiwan Stock Exchange	0.2638	0.0902	0.9899
Thailand	Stock Exchange of Thailand (SET)	0.5549	0.0887	1.6857
United Kingdom	SETS (Electronic Trading Service)	5.5062	2.7577	15.6142
United Kingdom	LSE-AIM	6.8126	3.2907	15.5403
United States	New York Stock Exchange	0.0618	0.0472	0.0831
United States	NASD OTC Bulletin Board	1.8826	0.1763	9.8004
United States	American Stock Exchange	0.3122	0.0928	1.4613
United States	Nasdaq	0.1427	0.0683	0.3654

Table 3: Descriptive statistics for spreads (mean, median and standard deviation) at levels. The descriptive statistics are cross-sectional descriptive statistics on mean spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	0.0368	0.0163	0.0929
Austria	Vienna Stock Exchange	1.5110	0.4234	2.8023
Belgium	Euronext Brussels	4.4023	0.9886	9.3865
Canada	TSX Venture Exchange	0.0709	0.0439	0.1359
Canada	Toronto Stock Exchange	0.1732	0.0822	0.4427
Chile	Santiago Stock Exchange	1.8188	0.0499	16.5520
China	Shanghai Stock Exchange	0.0020	0.0018	0.0010
China	Shenzhen Stock Exchange	0.0025	0.0019	0.0026
Denmark	Copenhagen Stock Exchange	1.7620	0.4483	5.9342
Egypt	Cairo Stock Exchange	0.1652	0.0806	0.3089
Finland	Helsinki Stock Exchange	0.2684	0.1089	0.6190
France	Euronext Paris	3.4368	0.7168	13.2135
Germany	Berlin Stock Exchange	1.4676	0.5986	11.7345
Germany	Stuttgart Stock Exchange	4.1990	0.5254	35.1994
Germany	Munich Stock Exchange	1.6915	0.7634	6.3852
Germany	Frankfurt Stock Exchange	3.3044	0.6001	13.9239
Germany	Duesseldorf Stock Exchange	1.1576	0.5321	2.9350
Greece	Athens Stock Exchange	0.0892	0.0560	0.1882
Hong Kong	Hong Kong Stock Exchange	0.0098	0.0029	0.0561
India	Bombay Stock Exchange	0.0662	0.0283	0.1827
India	Indian National Exchange	0.0330	0.0162	0.0531
Indonesia	Jakarta Stock Exchange	0.0082	0.0018	0.0295
Italy	Milano Stock Exchange	0.0999	0.0388	0.1743
Japan	Tokyo Stock Exchange	4.7247	0.0869	13.5257
Japan	Osaka Stock Exchange	0.5746	0.1129	2.5548
Japan	Japan Securities DAQS	5.0826	0.1930	12.8147
Jordan	Amman Financial Market	0.1021	0.0572	0.1143
Korea	Korea Stock Exchange	0.1458	0.0617	0.3703
Korea	KOSDAQ	0.0651	0.0280	0.1523
Malaysia	Kuala Lumpur Stock Exchange	0.0094	0.0061	0.0134
Netherlands	Euronext Amsterdam	0.7248	0.1662	1.8463
New Zealand	New Zealand Stock Exchange	0.0669	0.0303	0.1221
Norway	Oslo Stock Exchange	0.4967	0.1197	2.1583
Singapore	Stock Exchange of Singapore	0.0097	0.0058	0.0208
South Africa	Johannesburg Stock Exchange	6.9367	1.9231	21.1736
Spain	Barcelona Stock Exchange	0.1834	0.0709	0.2719
Sweden	Stockholm Stock Exchange	0.1604	0.0786	0.3370
Switzerland	CHE SWX Swiss Exchange	5.7291	1.1623	17.6479
Taiwan	Taiwan Stock Exchange	0.0082	0.0028	0.0306
Thailand	Stock Exchange of Thailand (SET)	0.0178	0.0028	0.0541
United Kingdom	SETS (Electronic Trading Service)	10.8561	5.4370	30.7851
United Kingdom	LSE-AIM	13.4317	6.4879	30.6393
United States	New York Stock Exchange	0.0618	0.0472	0.0831
United States	NASD OTC Bulletin Board	1.8826	0.1763	9.8004
United States	American Stock Exchange	0.3122	0.0928	1.4613
United States	Nasdaq	0.1427	0.0683	0.3654

Table 4: Descriptive statistics for U.S. Dollar spreads (mean, median and standard deviation) at levels. The descriptive statistics are cross-sectional descriptive statistics on mean spreads across stocks listed in the exchange. Mean spread for each stock is divided by the foreign exchange rate as of February, 2008.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	0.0612	0.0525	0.0439
Austria	Vienna Stock Exchange	0.0481	0.0248	0.0544
Belgium	Euronext Brussels	0.0423	0.0276	0.0418
Canada	TSX Venture Exchange	0.1411	0.1368	0.0554
Canada	Toronto Stock Exchange	0.0445	0.0357	0.0355
Chile	Santiago Stock Exchange	0.0990	0.0839	0.0579
China	Shanghai Stock Exchange	0.0022	0.0022	0.0006
China	Shenzhen Stock Exchange	0.0020	0.0021	0.0008
Denmark	Copenhagen Stock Exchange	0.0324	0.0175	0.0347
Egypt	Cairo Stock Exchange	0.0342	0.0318	0.0249
Finland	Helsinki Stock Exchange	0.0295	0.0193	0.0282
France	Euronext Paris	0.0598	0.0408	0.0550
Germany	Berlin Stock Exchange	0.0640	0.0495	0.0457
Germany	Stuttgart Stock Exchange	0.0818	0.0673	0.0565
Germany	Munich Stock Exchange	0.0562	0.0422	0.0405
Germany	Frankfurt Stock Exchange	0.0567	0.0426	0.0425
Germany	Duesseldorf Stock Exchange	0.0422	0.0371	0.0277
Greece	Athens Stock Exchange	0.0178	0.0154	0.0110
Hong Kong	Hong Kong Stock Exchange	0.0367	0.0261	0.0326
India	Bombay Stock Exchange	0.0426	0.0293	0.0422
India	Indian National Exchange	0.0094	0.0063	0.0143
Indonesia	Jakarta Stock Exchange	0.0872	0.0707	0.0632
Italy	Milano Stock Exchange	0.0087	0.0057	0.0098
Japan	Tokyo Stock Exchange	0.0126	0.0085	0.0125
Japan	Osaka Stock Exchange	0.0377	0.0252	0.0357
Japan	Japan Securities DAQS	0.0347	0.0255	0.0301
Jordan	Amman Financial Market	0.0285	0.0215	0.0212
Korea	Korea Stock Exchange	0.0094	0.0076	0.0079
Korea	KOSDAQ	0.0098	0.0090	0.0053
Malaysia	Kuala Lumpur Stock Exchange	0.0322	0.0234	0.0263
Netherlands	Euronext Amsterdam	0.0308	0.0164	0.0417
New Zealand	New Zealand Stock Exchange	0.0550	0.0314	0.0617
Norway	Oslo Stock Exchange	0.0366	0.0247	0.0352
Singapore	Stock Exchange of Singapore	0.0498	0.0334	0.0438
South Africa	Johannesburg Stock Exchange	0.0570	0.0364	0.0584
Spain	Barcelona Stock Exchange	0.0115	0.0075	0.0126
Sweden	Stockholm Stock Exchange	0.0333	0.0220	0.0341
Switzerland	CHE SWX Swiss Exchange	0.0262	0.0168	0.0311
Taiwan	Taiwan Stock Exchange	0.0090	0.0057	0.0105
Thailand	Stock Exchange of Thailand (SET)	0.0354	0.0154	0.0464
United Kingdom	SETS (Electronic Trading Service)	0.0343	0.0223	0.0383
United Kingdom	LSE-AIM	0.1002	0.0855	0.0602
United States	New York Stock Exchange	0.0039	0.0025	0.0052
United States	NASD OTC Bulletin Board	0.1066	0.0920	0.0673
United States	American Stock Exchange	0.0374	0.0289	0.0313
United States	Nasdaq	0.0151	0.0088	0.0174

Table 5: Descriptive statistics for proportional spreads (mean, median and standard deviation) at levels. The descriptive statistics are cross-sectional descriptive statistics on mean proportional spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	0.0385	0.0175	0.0945
Austria	Vienna Stock Exchange	1.3563	0.3284	3.6037
Belgium	Euronext Brussels	3.0000	0.6445	6.5281
Canada	TSX Venture Exchange	0.0670	0.0407	0.1443
Canada	Toronto Stock Exchange	0.1462	0.0727	0.3167
Chile	Santiago Stock Exchange	697.9674	17.1218	6305.1090
China	Shanghai Stock Exchange	0.0213	0.0158	0.0519
China	Shenzhen Stock Exchange	0.0221	0.0154	0.0372
Denmark	Copenhagen Stock Exchange	8.3221	2.0909	26.0496
Egypt	Cairo Stock Exchange	0.8992	0.4237	1.6478
Finland	Helsinki Stock Exchange	0.1525	0.0688	0.3170
France	Euronext Paris	2.1735	0.4428	8.5755
Germany	Berlin Stock Exchange	2.2010	0.7101	11.5203
Germany	Stuttgart Stock Exchange	2.7594	0.2813	23.0845
Germany	Munich Stock Exchange	2.2460	0.8047	10.0640
Germany	Frankfurt Stock Exchange	2.5135	0.3685	9.2031
Germany	Duesseldorf Stock Exchange	1.7242	0.6260	3.3840
Greece	Athens Stock Exchange	0.0620	0.0405	0.1198
Hong Kong	Hong Kong Stock Exchange	0.0948	0.0200	0.8148
India	Bombay Stock Exchange	2.3798	1.1043	5.4604
India	Indian National Exchange	1.4291	0.8083	1.9738
Indonesia	Jakarta Stock Exchange	63.4256	14.7929	224.7862
Italy	Milano Stock Exchange	0.1024	0.0362	0.1884
Japan	Tokyo Stock Exchange	399.6449	7.3452	1069.5380
Japan	Osaka Stock Exchange	54.5661	8.2493	272.4620
Japan	Japan Securities DAQS	471.2424	16.1664	1774.0500
Jordan	Amman Financial Market	0.0712	0.0400	0.0779
Korea	Korea Stock Exchange	138.2800	57.9566	336.5081
Korea	KOSDAQ	61.7155	26.2471	148.2912
Malaysia	Kuala Lumpur Stock Exchange	0.0275	0.0182	0.0355
Netherlands	Euronext Amsterdam	0.4615	0.1063	1.1916
New Zealand	New Zealand Stock Exchange	0.0818	0.0397	0.1434
Norway	Oslo Stock Exchange	2.3634	0.6181	9.9498
Singapore	Stock Exchange of Singapore	0.0122	0.0073	0.0253
South Africa	Johannesburg Stock Exchange	43.7210	13.0702	123.0562
Spain	Barcelona Stock Exchange	0.1061	0.0440	0.1423
Sweden	Stockholm Stock Exchange	0.9458	0.4763	1.8534
Switzerland	CHE SWX Swiss Exchange	6.0577	1.3599	17.3229
Taiwan	Taiwan Stock Exchange	0.2484	0.0879	1.0076
Thailand	Stock Exchange of Thailand (SET)	0.4654	0.0884	1.3012
United Kingdom	SETS (Electronic Trading Service)	0.6658	0.3483	1.1117
United Kingdom	LSE-AIM	0.1632	0.0017	2.0504
United States	New York Stock Exchange	0.0488	0.0346	0.1471
United States	NASD OTC Bulletin Board	1.6393	0.1533	8.5865
United States	American Stock Exchange	0.2330	0.0613	1.2084
United States	Nasdaq	0.1343	0.0726	0.2859

Table 6: Descriptive statistics for effective spreads (mean, median and standard deviation) at levels. The descriptive statistics are cross-sectional descriptive statistics on mean effective spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	0.0594	0.0502	0.0439
Austria	Vienna Stock Exchange	0.0566	0.0241	0.0671
Belgium	Euronext Brussels	0.0419	0.0259	0.0424
Canada	TSX Venture Exchange	0.1327	0.1268	0.0540
Canada	Toronto Stock Exchange	0.0410	0.0321	0.0334
Chile	Santiago Stock Exchange	0.0815	0.0648	0.0559
China	Shanghai Stock Exchange	0.0028	0.0025	0.0042
China	Shenzhen Stock Exchange	0.0026	0.0023	0.0052
Denmark	Copenhagen Stock Exchange	0.0305	0.0163	0.0432
Egypt	Cairo Stock Exchange	0.0354	0.0326	0.0285
Finland	Helsinki Stock Exchange	0.0254	0.0174	0.0231
France	Euronext Paris	0.0556	0.0368	0.0530
Germany	Berlin Stock Exchange	0.1241	0.1041	0.0898
Germany	Stuttgart Stock Exchange	0.0703	0.0561	0.0493
Germany	Munich Stock Exchange	0.1008	0.0647	0.0953
Germany	Frankfurt Stock Exchange	0.0603	0.0392	0.0648
Germany	Duesseldorf Stock Exchange	0.0992	0.0852	0.0694
Greece	Athens Stock Exchange	0.0172	0.0150	0.0104
Hong Kong	Hong Kong Stock Exchange	0.0288	0.0216	0.0234
India	Bombay Stock Exchange	0.0397	0.0244	0.0462
India	Indian National Exchange	0.0104	0.0074	0.0158
Indonesia	Jakarta Stock Exchange	0.0741	0.0601	0.0531
Italy	Milano Stock Exchange	0.0106	0.0082	0.0089
Japan	Tokyo Stock Exchange	0.0097	0.0070	0.0088
Japan	Osaka Stock Exchange	0.0255	0.0176	0.0231
Japan	Japan Securities DAQS	0.0282	0.0184	0.0320
Jordan	Amman Financial Market	0.0272	0.0211	0.0200
Korea	Korea Stock Exchange	0.0096	0.0077	0.0139
Korea	KOSDAQ	0.0104	0.0085	0.0171
Malaysia	Kuala Lumpur Stock Exchange	0.0291	0.0219	0.0229
Netherlands	Euronext Amsterdam	0.0293	0.0158	0.0369
New Zealand	New Zealand Stock Exchange	0.0558	0.0308	0.0682
Norway	Oslo Stock Exchange	0.0321	0.0227	0.0299
Singapore	Stock Exchange of Singapore	0.0421	0.0290	0.0361
South Africa	Johannesburg Stock Exchange	0.0551	0.0349	0.0561
Spain	Barcelona Stock Exchange	0.0099	0.0069	0.0098
Sweden	Stockholm Stock Exchange	0.0303	0.0195	0.0315
Switzerland	CHE SWX Swiss Exchange	0.0287	0.0170	0.0395
Taiwan	Taiwan Stock Exchange	0.0087	0.0056	0.0143
Thailand	Stock Exchange of Thailand (SET)	0.0316	0.0147	0.0447
United Kingdom	SETS (Electronic Trading Service)	0.0029	0.0018	0.0040
United Kingdom	LSE-AIM	0.0017	0.0000	0.0044
United States	New York Stock Exchange	0.0028	0.0018	0.0061
United States	NASD OTC Bulletin Board	0.0901	0.0755	0.0606
United States	American Stock Exchange	0.0263	0.0184	0.0254
United States	Nasdaq	0.0142	0.0089	0.0150

Table 7: Descriptive statistics for proportional effective spreads (mean, median and standard deviation) at levels. The descriptive statistics are cross-sectional descriptive statistics on mean proportional effective spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	0.0618	0.0528	0.0444
Austria	Vienna Stock Exchange	0.0484	0.0248	0.0546
Belgium	Euronext Brussels	0.0426	0.0276	0.0423
Canada	TSX Venture Exchange	0.1444	0.1403	0.0569
Canada	Toronto Stock Exchange	0.0451	0.0358	0.0363
Chile	Santiago Stock Exchange	0.0964	0.0819	0.0521
China	Shanghai Stock Exchange	0.0022	0.0022	0.0006
China	Shenzhen Stock Exchange	0.0020	0.0021	0.0008
Denmark	Copenhagen Stock Exchange	0.0319	0.0175	0.0332
Egypt	Cairo Stock Exchange	0.0343	0.0316	0.0257
Finland	Helsinki Stock Exchange	0.0295	0.0193	0.0281
France	Euronext Paris	0.0591	0.0404	0.0541
Germany	Berlin Stock Exchange	0.0653	0.0500	0.0470
Germany	Stuttgart Stock Exchange	0.0857	0.0691	0.0612
Germany	Munich Stock Exchange	0.0566	0.0430	0.0401
Germany	Frankfurt Stock Exchange	0.0573	0.0432	0.0427
Germany	Duesseldorf Stock Exchange	0.0427	0.0374	0.0272
Greece	Athens Stock Exchange	0.0177	0.0154	0.0107
Hong Kong	Hong Kong Stock Exchange	0.0363	0.0260	0.0318
India	Bombay Stock Exchange	0.0432	0.0295	0.0435
India	Indian National Exchange	0.0095	0.0063	0.0161
Indonesia	Jakarta Stock Exchange	0.0851	0.0710	0.0607
Italy	Milano Stock Exchange	0.0087	0.0057	0.0097
Japan	Tokyo Stock Exchange	0.0126	0.0085	0.0125
Japan	Osaka Stock Exchange	0.0378	0.0251	0.0358
Japan	Japan Securities DAQS	0.0344	0.0255	0.0292
Jordan	Amman Financial Market	0.0284	0.0215	0.0213
Korea	Korea Stock Exchange	0.0094	0.0076	0.0079
Korea	KOSDAQ	0.0098	0.0090	0.0052
Malaysia	Kuala Lumpur Stock Exchange	0.0321	0.0234	0.0261
Netherlands	Euronext Amsterdam	0.0308	0.0166	0.0420
New Zealand	New Zealand Stock Exchange	0.0543	0.0316	0.0566
Norway	Oslo Stock Exchange	0.0362	0.0245	0.0347
Singapore	Stock Exchange of Singapore	0.0494	0.0334	0.0431
South Africa	Johannesburg Stock Exchange	0.0555	0.0364	0.0545
Spain	Barcelona Stock Exchange	0.0115	0.0075	0.0125
Sweden	Stockholm Stock Exchange	0.0333	0.0221	0.0338
Switzerland	CHE SWX Swiss Exchange	0.0262	0.0168	0.0310
Taiwan	Taiwan Stock Exchange	0.0090	0.0057	0.0104
Thailand	Stock Exchange of Thailand (SET)	0.0353	0.0155	0.0458
United Kingdom	SETS (Electronic Trading Service)	0.0342	0.0223	0.0382
United Kingdom	LSE-AIM	0.1001	0.0855	0.0600
United States	New York Stock Exchange	0.0039	0.0025	0.0051
United States	NASD OTC Bulletin Board	0.1050	0.0923	0.0643
United States	American Stock Exchange	0.0375	0.0289	0.0315
United States	Nasdaq	0.0152	0.0089	0.0175

Table 8: Descriptive statistics for percentage spreads (mean, median and standard deviation) at levels. The descriptive statistics are cross-sectional descriptive statistics on mean percentage spreads across stocks listed in the exchange.

Country	Exchange	S-PS	S-ES	S-PES	S-PRS	PS-ES	PS-PES	PS-PRD	ES-PES	ES-PRS	PES-PRD
Australia	Nationall Automated Trading	0.6570	0.7140	0.4433	0.6530	0.4390	0.7129	0.9918	0.7046	0.4365	0.7227
Austria	Vienna Stock Exchange	0.7977	0.6171	0.4822	0.7941	0.4548	0.6088	0.9922	0.8389	0.4488	0.6079
Belgium	Euronext Brussels	0.8730	0.6878	0.5961	0.8701	0.5849	0.6950	0.9958	0.8946	0.5874	0.7032
Canada	TSX Venture Exchange	0.6055	0.6418	0.3412	0.5897	0.3182	0.5966	0.9737	0.6748	0.3109	0.6281
Canada	Toronto Stock Exchange	0.6577	0.6562	0.4210	0.6547	0.4077	0.6886	0.9953	0.7236	0.4097	0.6994
Chile	Santiago Stock Exchange	0.8433	0.7610	0.6103	0.8470	0.6370	0.7276	0.9908	0.8627	0.6283	0.7225
China	Shanghai Stock Exchange	0.6494	0.3400	0.2349	0.6493	0.1310	0.3946	0.9991	0.7817	0.1308	0.3947
China	Shenzhen Stock Exchange	0.6630	0.5080	0.3729	0.6629	0.3206	0.5848	0.9991	0.7988	0.3211	0.5858
Denmark	Copenhagen Stock Exchange	0.6752	0.6762	0.4330	0.6755	0.4044	0.6550	0.9969	0.7398	0.3981	0.6510
Egypt	Cairo Stock Exchange	0.6192	0.5816	0.3083	0.6205	0.2822	0.4720	0.9970	0.7168	0.2722	0.4608
Finland	Helsinki Stock Exchange	0.7399	0.6886	0.5047	0.7386	0.4598	0.6975	0.9980	0.7666	0.4582	0.6990
France	Euronext Paris	0.7917	0.7305	0.5537	0.7902	0.5459	0.7081	0.9933	0.8159	0.5392	0.7079
Germany	Berlin Stock Exchange	0.6747	0.3623	0.3101	0.6580	0.1237	0.2266	0.9487	0.8928	0.1320	0.2569
Germany	Stuttgart Stock Exchange	0.7065	0.4888	0.3780	0.7055	0.2038	0.3902	0.9941	0.8398	0.2502	0.4441
Germany	Munich Stock Exchange	0.6594	0.3722	0.2881	0.6480	0.1233	0.2578	0.9685	0.8470	0.1299	0.2756
Germany	Frankfurt Stock Exchange	0.6485	0.4660	0.3328	0.6463	0.1909	0.3619	0.9882	0.8449	0.1927	0.3702
Germany	Duesseldorf Stock Exchange	0.5478	0.2871	0.2381	0.5413	0.0288	0.2170	0.9818	0.7225	0.0378	0.2428
Greece	Athens Stock Exchange	0.6005	0.4742	0.3058	0.5998	0.1886	0.5333	0.9991	0.6657	0.1841	0.5285
Hong Kong	Hong Kong Stock Exchange	0.6228	0.6302	0.4021	0.6224	0.3200	0.6645	0.9972	0.6763	0.3173	0.6643
India	Bombay Stock Exchange	0.5362	0.6672	0.3586	0.5339	0.2558	0.6953	0.9954	0.5475	0.2566	0.7046
India	Indian National Exchange	0.5972	0.5320	0.1918	0.5969	0.1951	0.3507	0.9992	0.6788	0.1959	0.3526
Indonesia	Jakarta Stock Exchange	0.6506	0.7716	0.4726	0.6427	0.4336	0.7372	0.9890	0.6646	0.4107	0.7281
Italy	Milano Stock Exchange	0.8627	0.4235	0.3752	0.8629	0.3314	0.4585	0.9987	0.8885	0.3295	0.4568
Japan	Tokyo Stock Exchange	0.8042	0.7349	0.5966	0.8040	0.5840	0.7556	0.9992	0.8409	0.5839	0.7564
Japan	Osaka Stock Exchange	0.8138	0.6430	0.5367	0.8125	0.4711	0.6406	0.9983	0.8472	0.4700	0.6425
Japan	Japan Securities DAQS	0.7904	0.6456	0.5093	0.7900	0.4840	0.6550	0.9974	0.8390	0.4788	0.6524
Jordan	Amman Financial Market	0.8988	0.6431	0.5676	0.8953	0.5437	0.6071	0.9979	0.9176	0.5359	0.6035
Korea	Korea Stock Exchange	0.7055	0.8850	0.6186	0.7055	0.6074	0.8815	0.9992	0.7231	0.6057	0.8802
Korea	KOSDAQ	0.6986	0.8738	0.6027	0.6990	0.5790	0.8739	0.9994	0.7010	0.5783	0.8730
Malaysia	Kuala Lumpur Stock Exchange	0.7641	0.7173	0.5584	0.7624	0.5339	0.7432	0.9972	0.8076	0.5284	0.7419
Netherlands	Euronext Amsterdam	0.7633	0.6544	0.4922	0.7627	0.4685	0.6558	0.9957	0.8086	0.4665	0.6577
New Zealand	New Zealand Stock Exchange	0.7814	0.7216	0.5469	0.7807	0.5326	0.7144	0.9922	0.8138	0.5299	0.7175
Norway	Oslo Stock Exchange	0.7730	0.7166	0.5427	0.7729	0.5189	0.7132	0.9970	0.8044	0.5129	0.7098
Singapore	Stock Exchange of Singapore	0.7105	0.6054	0.4348	0.7077	0.3848	0.6687	0.9949	0.7514	0.3762	0.6668
South Africa	Johannesburg Stock Exchange	0.7124	0.7783	0.5355	0.7107	0.5425	0.7774	0.9924	0.7456	0.5306	0.7728
Spain	Barcelona Stock Exchange	0.7093	0.8384	0.6031	0.7087	0.5781	0.8163	0.9989	0.7597	0.5773	0.8169
Sweden	Stockholm Stock Exchange	0.6865	0.6593	0.4264	0.6862	0.4014	0.6503	0.9964	0.7388	0.4004	0.6530
Switzerland	CHE SWX Swiss Exchange	0.7904	0.6930	0.5227	0.7911	0.5068	0.6805	0.9964	0.8165	0.5043	0.6811
Taiwan	Taiwan Stock Exchange	0.7170	0.8294	0.5769	0.7171	0.5729	0.8202	0.9988	0.7472	0.5718	0.8197
Thailand	Stock Exchange of Thailand (SET)	0.6838	0.8091	0.5408	0.6810	0.5004	0.8002	0.9961	0.6984	0.4946	0.8000
United Kingdom	SETS (Electronic Trading Service)	0.6888	0.2983	0.2815	0.6889	0.0330	0.0868	0.9998	0.9384	0.0322	0.0860
United Kingdom	LSE-AIM	0.5523	0.1751	0.1900	0.5524	-0.0479	-0.0034	0.9999	0.9278	-0.0532	-0.0112
United States	New York Stock Exchange	0.7879	0.6087	0.5003	0.7879	0.4358	0.6070	0.9995	0.8467	0.4354	0.6068
United States	NASD OTC Bulletin Board	0.6551	0.6786	0.4291	0.6528	0.4005	0.6557	0.9845	0.7100	0.3885	0.6543
United States	American Stock Exchange	0.6839	0.5138	0.3582	0.6820	0.3173	0.5769	0.9970	0.7664	0.3162	0.5808
United States	Nasdaq	0.7665	0.5394	0.4281	0.7654	0.3939	0.5788	0.9986	0.8200	0.3951	0.5827

Table 9: Correlations of different liquidity measures. Correlations are cross-sectional means of time-series correlation coefficients across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	19.62%	17.11%	0.1248
Austria	Vienna Stock Exchange	14.86%	16.19%	0.1126
Belgium	Euronext Brussels	30.56%	25.14%	0.2251
Canada	TSX Venture Exchange	12.77%	12.70%	0.0899
Canada	Toronto Stock Exchange	29.00%	25.06%	0.1556
Chile	Santiago Stock Exchange	21.52%	13.46%	0.2812
China	Shanghai Stock Exchange	22.66%	18.47%	0.1819
China	Shenzhen Stock Exchange	26.17%	16.86%	0.3594
Denmark	Copenhagen Stock Exchange	19.32%	19.40%	0.0982
Egypt	Cairo Stock Exchange	31.20%	29.24%	0.2163
Finland	Helsinki Stock Exchange	33.62%	31.88%	0.1938
France	Euronext Paris	42.32%	39.52%	0.3173
Germany	Berlin Stock Exchange	1.21%	0.09%	0.1358
Germany	Stuttgart Stock Exchange	3.29%	1.36%	0.0579
Germany	Munich Stock Exchange	3.23%	2.36%	0.0440
Germany	Frankfurt Stock Exchange	6.13%	3.76%	0.1152
Germany	Duesseldorf Stock Exchange	10.70%	9.59%	0.0791
Greece	Athens Stock Exchange	32.21%	30.34%	0.1507
Hong Kong	Hong Kong Stock Exchange	21.74%	21.16%	0.1205
India	Bombay Stock Exchange	55.57%	56.98%	0.2293
India	Indian National Exchange	54.63%	56.77%	0.2168
Indonesia	Jakarta Stock Exchange	10.07%	9.50%	0.0764
Italy	Milano Stock Exchange	39.14%	39.12%	0.1958
Japan	Tokyo Stock Exchange	31.99%	31.35%	0.1241
Japan	Osaka Stock Exchange	28.55%	26.83%	0.1572
Japan	Japan Securities DAQS	33.52%	32.17%	0.1557
Jordan	Amman Financial Market	21.40%	20.06%	0.1658
Korea	Korea Stock Exchange	44.53%	43.18%	0.2118
Korea	KOSDAQ	51.34%	46.50%	0.3306
Malaysia	Kuala Lumpur Stock Exchange	20.82%	22.10%	0.0976
Netherlands	Euronext Amsterdam	37.07%	35.73%	0.1913
New Zealand	New Zealand Stock Exchange	15.50%	13.51%	0.1148
Norway	Oslo Stock Exchange	26.70%	28.45%	0.1022
Singapore	Stock Exchange of Singapore	10.77%	10.50%	0.0781
South Africa	Johannesburg Stock Exchange	33.37%	29.82%	0.2217
Spain	Barcelona Stock Exchange	38.98%	41.09%	0.2285
Sweden	Stockholm Stock Exchange	23.63%	24.69%	0.0959
Switzerland	CHE SWX Swiss Exchange	32.64%	29.65%	0.2191
Taiwan	Taiwan Stock Exchange	18.04%	16.68%	0.1142
Thailand	Stock Exchange of Thailand (SET)	12.73%	11.68%	0.0916
United Kingdom	SETS (Electronic Trading Service)	19.14%	14.71%	0.1695
United Kingdom	LSE-AIM	2.41%	2.06%	0.0239
United States	New York Stock Exchange	44.56%	42.97%	0.1699
United States	NASD OTC Bulletin Board	13.69%	12.07%	0.1109
United States	American Stock Exchange	27.25%	25.34%	0.1385
United States	Nasdaq	45.08%	40.07%	0.2079

Table 10: Descriptive statistics for percentage change in spreads (mean, median and standard deviation). The descriptive statistics are cross-sectional descriptive statistics on mean percentage change in spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	-0.0020	-0.0007	0.0056
Austria	Vienna Stock Exchange	-0.0309	-0.0099	0.0641
Belgium	Euronext Brussels	-0.0785	-0.0209	0.1563
Canada	TSX Venture Exchange	-0.0029	-0.0015	0.0061
Canada	Toronto Stock Exchange	-0.0084	-0.0031	0.0481
Chile	Santiago Stock Exchange	-44.1260	-0.4460	459.3957
China	Shanghai Stock Exchange	-0.0011	-0.0008	0.0012
China	Shenzhen Stock Exchange	-0.0022	-0.0010	0.0042
Denmark	Copenhagen Stock Exchange	-0.2898	-0.0881	0.5633
Egypt	Cairo Stock Exchange	-0.0478	-0.0182	0.1343
Finland	Helsinki Stock Exchange	-0.0055	-0.0034	0.0091
France	Euronext Paris	-0.0577	-0.0201	0.1514
Germany	Berlin Stock Exchange	-0.0351	-0.0005	1.4349
Germany	Stuttgart Stock Exchange	-0.0589	-0.0084	0.3468
Germany	Munich Stock Exchange	-0.0119	-0.0025	0.0679
Germany	Frankfurt Stock Exchange	-0.0456	-0.0053	0.2783
Germany	Duesseldorf Stock Exchange	-0.0107	-0.0052	0.0272
Greece	Athens Stock Exchange	-0.0031	-0.0020	0.0051
Hong Kong	Hong Kong Stock Exchange	-0.0026	-0.0009	0.0069
India	Bombay Stock Exchange	-0.1924	-0.0704	0.4603
India	Indian National Exchange	-0.0941	-0.0405	0.2692
Indonesia	Jakarta Stock Exchange	-3.1492	-0.4597	18.3212
Italy	Milano Stock Exchange	-0.0076	-0.0014	0.0172
Japan	Tokyo Stock Exchange	-20.2059	-0.4685	63.9860
Japan	Osaka Stock Exchange	-4.0610	-0.4100	45.6898
Japan	Japan Securities DAQS	-24.5451	-0.9733	64.4281
Jordan	Amman Financial Market	-0.0055	-0.0027	0.0111
Korea	Korea Stock Exchange	-14.8917	-5.1380	44.8150
Korea	KOSDAQ	-6.0848	-2.6026	10.9303
Malaysia	Kuala Lumpur Stock Exchange	-0.0013	-0.0009	0.0019
Netherlands	Euronext Amsterdam	-0.0204	-0.0057	0.0674
New Zealand	New Zealand Stock Exchange	-0.0029	-0.0013	0.0067
Norway	Oslo Stock Exchange	-0.0922	-0.0291	0.2778
Singapore	Stock Exchange of Singapore	-0.0007	-0.0002	0.0067
South Africa	Johannesburg Stock Exchange	-2.8662	-0.8350	12.3502
Spain	Barcelona Stock Exchange	-0.0054	-0.0027	0.0072
Sweden	Stockholm Stock Exchange	-0.0485	-0.0219	0.1094
Switzerland	CHE SWX Swiss Exchange	-0.1702	-0.0695	0.3513
Taiwan	Taiwan Stock Exchange	-0.0067	-0.0038	0.0119
Thailand	Stock Exchange of Thailand (SET)	-0.0220	-0.0023	0.0726
United Kingdom	SETS (Electronic Trading Service)	-0.0727	-0.0336	0.1992
United Kingdom	LSE-AIM	-0.0018	0.0000	0.1601
United States	New York Stock Exchange	-0.0029	-0.0019	0.0052
United States	NASD OTC Bulletin Board	-0.0812	-0.0054	0.6003
United States	American Stock Exchange	-0.0107	-0.0022	0.0651
United States	Nasdaq	-0.0059	-0.0034	0.0143

Table 11: Descriptive statistics for first difference of spreads (mean, median and standard deviation). The descriptive statistics are cross-sectional descriptive statistics on mean first difference of spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	-0.0019	-0.0012	0.0023
Austria	Vienna Stock Exchange	-0.0014	-0.0007	0.0018
Belgium	Euronext Brussels	-0.0011	-0.0007	0.0011
Canada	TSX Venture Exchange	-0.0049	-0.0037	0.0044
Canada	Toronto Stock Exchange	-0.0013	-0.0007	0.0019
Chile	Santiago Stock Exchange	-0.0024	-0.0011	0.0046
China	Shanghai Stock Exchange	-0.0001	-0.0001	0.0001
China	Shenzhen Stock Exchange	-0.0001	-0.0001	0.0001
Denmark	Copenhagen Stock Exchange	-0.0010	-0.0006	0.0012
Egypt	Cairo Stock Exchange	-0.0008	-0.0006	0.0008
Finland	Helsinki Stock Exchange	-0.0007	-0.0006	0.0008
France	Euronext Paris	-0.0024	-0.0010	0.0039
Germany	Berlin Stock Exchange	-0.0004	-0.0001	0.0018
Germany	Stuttgart Stock Exchange	-0.0032	-0.0015	0.0053
Germany	Munich Stock Exchange	-0.0005	-0.0002	0.0017
Germany	Frankfurt Stock Exchange	-0.0017	-0.0005	0.0063
Germany	Duesseldorf Stock Exchange	-0.0004	-0.0003	0.0008
Greece	Athens Stock Exchange	-0.0004	-0.0004	0.0002
Hong Kong	Hong Kong Stock Exchange	-0.0016	-0.0007	0.0028
India	Bombay Stock Exchange	-0.0014	-0.0010	0.0018
India	Indian National Exchange	-0.0003	-0.0002	0.0004
Indonesia	Jakarta Stock Exchange	-0.0047	-0.0016	0.0077
Italy	Milano Stock Exchange	-0.0005	-0.0003	0.0007
Japan	Tokyo Stock Exchange	-0.0006	-0.0004	0.0007
Japan	Osaka Stock Exchange	-0.0016	-0.0006	0.0032
Japan	Japan Securities DAQS	-0.0015	-0.0008	0.0023
Jordan	Amman Financial Market	-0.0017	-0.0012	0.0016
Korea	Korea Stock Exchange	-0.0006	-0.0004	0.0006
Korea	KOSDAQ	-0.0007	-0.0006	0.0006
Malaysia	Kuala Lumpur Stock Exchange	-0.0013	-0.0008	0.0016
Netherlands	Euronext Amsterdam	-0.0011	-0.0006	0.0015
New Zealand	New Zealand Stock Exchange	-0.0016	-0.0008	0.0022
Norway	Oslo Stock Exchange	-0.0017	-0.0010	0.0025
Singapore	Stock Exchange of Singapore	-0.0017	-0.0008	0.0029
South Africa	Johannesburg Stock Exchange	-0.0028	-0.0015	0.0040
Spain	Barcelona Stock Exchange	-0.0004	-0.0002	0.0003
Sweden	Stockholm Stock Exchange	-0.0013	-0.0007	0.0021
Switzerland	CHE SWX Swiss Exchange	-0.0011	-0.0006	0.0017
Taiwan	Taiwan Stock Exchange	-0.0002	-0.0002	0.0002
Thailand	Stock Exchange of Thailand (SET)	-0.0013	-0.0004	0.0028
United Kingdom	SETS (Electronic Trading Service)	-0.0002	-0.0002	0.0005
United Kingdom	LSE-AIM	0.0001	0.0000	0.0012
United States	New York Stock Exchange	-0.0002	-0.0001	0.0002
United States	NASD OTC Bulletin Board	-0.0036	-0.0017	0.0053
United States	American Stock Exchange	-0.0007	-0.0004	0.0012
United States	Nasdaq	-0.0005	-0.0003	0.0006

Table 12: Descriptive statistics for first difference of proportional spreads (mean, median and standard deviation). The descriptive statistics are cross-sectional descriptive statistics on mean first difference of proportional spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	-0.0013	-0.0005	0.0034
Austria	Vienna Stock Exchange	-0.0172	-0.0030	0.0489
Belgium	Euronext Brussels	-0.0485	-0.0146	0.1087
Canada	TSX Venture Exchange	-0.0013	-0.0006	0.0033
Canada	Toronto Stock Exchange	-0.0039	-0.0017	0.0116
Chile	Santiago Stock Exchange	-19.6351	-0.0974	207.7460
China	Shanghai Stock Exchange	-0.0007	-0.0005	0.0012
China	Shenzhen Stock Exchange	-0.0019	-0.0007	0.0043
Denmark	Copenhagen Stock Exchange	-0.1733	-0.0573	0.3358
Egypt	Cairo Stock Exchange	-0.0345	-0.0106	0.1379
Finland	Helsinki Stock Exchange	-0.0037	-0.0023	0.0072
France	Euronext Paris	-0.0335	-0.0132	0.0867
Germany	Berlin Stock Exchange	-0.0054	0.0036	0.5869
Germany	Stuttgart Stock Exchange	-0.0605	-0.0038	0.4608
Germany	Munich Stock Exchange	0.0233	0.0037	0.2383
Germany	Frankfurt Stock Exchange	-0.0013	-0.0019	0.4047
Germany	Duesseldorf Stock Exchange	0.0081	0.0025	0.0384
Greece	Athens Stock Exchange	-0.0016	-0.0007	0.0039
Hong Kong	Hong Kong Stock Exchange	-0.0017	-0.0005	0.0065
India	Bombay Stock Exchange	-0.1297	-0.0442	0.2677
India	Indian National Exchange	-0.0796	-0.0306	0.3014
Indonesia	Jakarta Stock Exchange	-1.1958	-0.1600	7.4374
Italy	Milano Stock Exchange	-0.0051	-0.0008	0.0129
Japan	Tokyo Stock Exchange	-13.2074	-0.3280	43.9032
Japan	Osaka Stock Exchange	-0.9479	-0.1421	16.5623
Japan	Japan Securities DAQS	-16.6679	-0.5742	49.7950
Jordan	Amman Financial Market	-0.0041	-0.0019	0.0100
Korea	Korea Stock Exchange	-12.2710	-4.0114	36.5164
Korea	KOSDAQ	-3.3658	-1.2992	8.1905
Malaysia	Kuala Lumpur Stock Exchange	-0.0009	-0.0006	0.0012
Netherlands	Euronext Amsterdam	-0.0086	-0.0042	0.0280
New Zealand	New Zealand Stock Exchange	-0.0019	-0.0011	0.0036
Norway	Oslo Stock Exchange	-0.0522	-0.0185	0.1307
Singapore	Stock Exchange of Singapore	-0.0005	-0.0001	0.0050
South Africa	Johannesburg Stock Exchange	-2.1554	-0.5733	10.4744
Spain	Barcelona Stock Exchange	-0.0040	-0.0021	0.0050
Sweden	Stockholm Stock Exchange	-0.0264	-0.0112	0.0618
Switzerland	CHE SWX Swiss Exchange	-0.1167	-0.0494	0.2316
Taiwan	Taiwan Stock Exchange	-0.0037	-0.0031	0.0160
Thailand	Stock Exchange of Thailand (SET)	-0.0066	-0.0013	0.0532
United Kingdom	SETS (Electronic Trading Service)	-0.0356	-0.0052	0.1136
United Kingdom	LSE-AIM	-0.0013	0.0000	0.0285
United States	New York Stock Exchange	-0.0018	-0.0012	0.0043
United States	NASD OTC Bulletin Board	-0.0468	-0.0022	0.3528
United States	American Stock Exchange	-0.0063	-0.0009	0.0430
United States	Nasdaq	-0.0037	-0.0023	0.0089

Table 13: Descriptive statistics for first difference of effective spreads (mean, median and standard deviation). The descriptive statistics are cross-sectional descriptive statistics on mean first difference of effective spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	-0.0011	-0.0008	0.0014
Austria	Vienna Stock Exchange	-0.0006	-0.0003	0.0014
Belgium	Euronext Brussels	-0.0006	-0.0005	0.0007
Canada	TSX Venture Exchange	-0.0014	-0.0010	0.0024
Canada	Toronto Stock Exchange	-0.0006	-0.0004	0.0010
Chile	Santiago Stock Exchange	-0.0008	-0.0005	0.0013
China	Shanghai Stock Exchange	-0.0001	-0.0001	0.0001
China	Shenzhen Stock Exchange	-0.0001	-0.0001	0.0001
Denmark	Copenhagen Stock Exchange	-0.0006	-0.0004	0.0007
Egypt	Cairo Stock Exchange	-0.0004	-0.0003	0.0007
Finland	Helsinki Stock Exchange	-0.0004	-0.0003	0.0004
France	Euronext Paris	-0.0013	-0.0007	0.0023
Germany	Berlin Stock Exchange	0.0006	0.0005	0.0024
Germany	Stuttgart Stock Exchange	-0.0013	-0.0008	0.0031
Germany	Munich Stock Exchange	0.0007	0.0004	0.0017
Germany	Frankfurt Stock Exchange	-0.0005	-0.0002	0.0027
Germany	Duesseldorf Stock Exchange	0.0009	0.0006	0.0015
Greece	Athens Stock Exchange	-0.0002	-0.0002	0.0002
Hong Kong	Hong Kong Stock Exchange	-0.0008	-0.0004	0.0015
India	Bombay Stock Exchange	-0.0008	-0.0006	0.0013
India	Indian National Exchange	-0.0002	-0.0002	0.0004
Indonesia	Jakarta Stock Exchange	-0.0009	-0.0004	0.0026
Italy	Milano Stock Exchange	-0.0003	-0.0002	0.0005
Japan	Tokyo Stock Exchange	-0.0004	-0.0003	0.0006
Japan	Osaka Stock Exchange	-0.0004	-0.0002	0.0018
Japan	Japan Securities DAQS	-0.0008	-0.0004	0.0013
Jordan	Amman Financial Market	-0.0013	-0.0009	0.0016
Korea	Korea Stock Exchange	-0.0004	-0.0003	0.0004
Korea	KOSDAQ	-0.0003	-0.0003	0.0003
Malaysia	Kuala Lumpur Stock Exchange	-0.0009	-0.0006	0.0010
Netherlands	Euronext Amsterdam	-0.0005	-0.0003	0.0007
New Zealand	New Zealand Stock Exchange	-0.0010	-0.0006	0.0013
Norway	Oslo Stock Exchange	-0.0009	-0.0006	0.0011
Singapore	Stock Exchange of Singapore	-0.0006	-0.0003	0.0013
South Africa	Johannesburg Stock Exchange	-0.0017	-0.0011	0.0024
Spain	Barcelona Stock Exchange	-0.0003	-0.0002	0.0002
Sweden	Stockholm Stock Exchange	-0.0006	-0.0004	0.0009
Switzerland	CHE SWX Swiss Exchange	-0.0007	-0.0004	0.0010
Taiwan	Taiwan Stock Exchange	-0.0002	-0.0002	0.0003
Thailand	Stock Exchange of Thailand (SET)	-0.0002	-0.0002	0.0012
United Kingdom	SETS (Electronic Trading Service)	-0.0001	0.0000	0.0002
United Kingdom	LSE-AIM	0.0000	0.0000	0.0002
United States	New York Stock Exchange	-0.0001	-0.0001	0.0002
United States	NASD OTC Bulletin Board	-0.0013	-0.0007	0.0029
United States	American Stock Exchange	-0.0003	-0.0002	0.0005
United States	Nasdaq	-0.0003	-0.0002	0.0004

Table 14: Descriptive statistics for first difference of proportional effective spreads (mean, median and standard deviation). The descriptive statistics are cross-sectional descriptive statistics on mean first difference of proportional effective spreads across stocks listed in the exchange.

Country	Exchange	Mean	Median	Std. Dev.
Australia	Nationall Automated Trading	-0.19%	-0.12%	0.0023
Austria	Vienna Stock Exchange	-0.13%	-0.07%	0.0016
Belgium	Euronext Brussels	-0.11%	-0.07%	0.0012
Canada	TSX Venture Exchange	-0.50%	-0.38%	0.0044
Canada	Toronto Stock Exchange	-0.13%	-0.07%	0.0019
Chile	Santiago Stock Exchange	-0.24%	-0.11%	0.0044
China	Shanghai Stock Exchange	-0.01%	-0.01%	0.0001
China	Shenzhen Stock Exchange	-0.01%	-0.01%	0.0001
Denmark	Copenhagen Stock Exchange	-0.10%	-0.06%	0.0012
Egypt	Cairo Stock Exchange	-0.08%	-0.06%	0.0008
Finland	Helsinki Stock Exchange	-0.07%	-0.06%	0.0008
France	Euronext Paris	-0.23%	-0.10%	0.0038
Germany	Berlin Stock Exchange	-0.05%	-0.01%	0.0019
Germany	Stuttgart Stock Exchange	-0.34%	-0.16%	0.0060
Germany	Munich Stock Exchange	-0.05%	-0.02%	0.0018
Germany	Frankfurt Stock Exchange	-0.17%	-0.05%	0.0061
Germany	Duesseldorf Stock Exchange	-0.04%	-0.03%	0.0008
Greece	Athens Stock Exchange	-0.04%	-0.04%	0.0002
Hong Kong	Hong Kong Stock Exchange	-0.15%	-0.07%	0.0025
India	Bombay Stock Exchange	-0.14%	-0.10%	0.0019
India	Indian National Exchange	-0.03%	-0.02%	0.0004
Indonesia	Jakarta Stock Exchange	-0.43%	-0.15%	0.0070
Italy	Milano Stock Exchange	-0.05%	-0.03%	0.0007
Japan	Tokyo Stock Exchange	-0.06%	-0.04%	0.0007
Japan	Osaka Stock Exchange	-0.16%	-0.06%	0.0034
Japan	Japan Securities DAQS	-0.14%	-0.08%	0.0022
Jordan	Amman Financial Market	-0.17%	-0.12%	0.0016
Korea	Korea Stock Exchange	-0.06%	-0.04%	0.0006
Korea	KOSDAQ	-0.07%	-0.06%	0.0006
Malaysia	Kuala Lumpur Stock Exchange	-0.13%	-0.08%	0.0016
Netherlands	Euronext Amsterdam	-0.10%	-0.06%	0.0015
New Zealand	New Zealand Stock Exchange	-0.16%	-0.08%	0.0021
Norway	Oslo Stock Exchange	-0.17%	-0.10%	0.0023
Singapore	Stock Exchange of Singapore	-0.17%	-0.08%	0.0029
South Africa	Johannesburg Stock Exchange	-0.27%	-0.15%	0.0036
Spain	Barcelona Stock Exchange	-0.04%	-0.02%	0.0003
Sweden	Stockholm Stock Exchange	-0.13%	-0.07%	0.0021
Switzerland	CHE SWX Swiss Exchange	-0.11%	-0.06%	0.0016
Taiwan	Taiwan Stock Exchange	-0.02%	-0.02%	0.0002
Thailand	Stock Exchange of Thailand (SET)	-0.13%	-0.04%	0.0028
United Kingdom	SETS (Electronic Trading Service)	-0.02%	-0.02%	0.0005
United Kingdom	LSE-AIM	0.01%	0.00%	0.0012
United States	New York Stock Exchange	-0.02%	-0.01%	0.0003
United States	NASD OTC Bulletin Board	-0.37%	-0.19%	0.0053
United States	American Stock Exchange	-0.08%	-0.05%	0.0012
United States	Nasdaq	-0.05%	-0.03%	0.0006

Table 15: Descriptive statistics for first difference of percentage spreads (mean, median and standard deviation). The descriptive statistics are cross-sectional descriptive statistics on mean first difference of percentage spreads across stocks listed in the exchange.

Empirical results

Our aim is to present and discuss the empirical results as similar to previous literature as possible. For this purpose, we included information in each table that is directly comparable. However, due to the extent of our study, comparisons between the results of different models can be made across tables. Each table that presents evidence of commonality (Table 16 through Table 27) is constructed in the same manner. The first column two columns are the country and the equity market. Concurrent refers to the coefficient of concurrent change in market liquidity (β_1), lag refers to the coefficient of the lagged change in market liquidity (β_2), lead refers to the coefficient of the lead change in market liquidity (β_3) and sum refers to the sum of concurrent, lag and lead coefficients ($\beta_1 + \beta_2 + \beta_3$). For each stock in a market, we estimate the related model. We then collect the explained coefficients. "Mean coefficients" sub-heading refers to averaging these coefficients across all stocks listed in the same exchange. "t-Statistic for means" heading refers to the t-statistic to test the significance of means of cross-sectional coefficients. "% Positive" sub-heading refers to the percentage of stocks with non-negative coefficient within the overall exchange. "% Positive and significant" refers to the percentage of stocks with positive and statistically significant (at 5% significance level) coefficients. Each table includes the estimated model.

Using percentage change for liquidity measures

Table 16 reports the results for the estimation of (Equation 1) commonality in liquidity using percentage change in spread and equally weighted market variables. We note that almost all markets have positive correlations with the exception of Vienna. Australia, Canada, Germany, Japan, United Kingdom and United States are among the countries with relatively high cor-

relation between individual companies' change in liquidity and change in overall market liquidity. Most of the correlation is contemporaneous, however smaller exchanges (or exchanges with smaller stocks) seem to have lag and lead correlations as well (i.e. American Stock Exchange and Frankfurt Stock Exchange). t-Statistics for concurrent and sum coefficients have higher number of significant exchanges.

In terms of the percentage of companies with significant concurrent commonality coefficients, all of the exchanges include stocks that have commonality. NYSE has the highest percentage (67.29%) followed by Nasdaq and Shangai Stock Exchange. The interesting point is that different stock exchanges in the same countries have different percentages of companies with commonality in liquidity. While Munich has 33.56%, Stuttgart has 5.81%. Similar patterns exist for Japan (between Tokyo and Osaka), United States (between NYSE and American Stock Exchange) and United Kingdom (between SETS and AIM). Such patters leads us to conclude that country variables should not be determinant of levels of commonality, considering that these variables are constant among the exchanges in the same countries.

Table 17 reports the results for the estimation of (Equation 2) commonality in liquidity using percentage change in spread and value weighted market variables. Since, it is argued that size is a possible characteristic of companies with commonality, we expect to have lower levels of commonality for exchanges where average relative market capitalization of companies is higher. For instance, we expect to have lower level of commonality for NYSE and LSE-SETS compared to using equal weighted market variables. While our expectation was met, we also note that majority of exchanges have lower levels of commonality, confirming that size is a determinant of commonality. However, there are some exchanges for which the level of commonality increases (i.e. Vienna, Santiago etc.).

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.4823	0.1626	0.1020	0.7469	11.7429	4.6772	2.9601	13.3358	68.39%	55.42%	53.33%	11.58%	4.03%	3.88%
Austria	Vienna Stock Exchange	-0.0449	-0.0106	-0.0565	-0.1121	-0.5610	-0.1268	-0.9109	-1.1315	44.44%	44.44%	50.00%	4.44%	1.11%	2.22%
Belgium	Euronext Brussels	0.2008	0.0754	-0.0048	0.2714	4.1038	1.8208	-0.1170	3.6346	63.35%	49.21%	52.88%	5.24%	3.66%	2.62%
Canada	TSX Venture Exchange	0.5587	0.0753	0.2542	0.8881	16.7762	2.7868	7.6749	18.0592	69.07%	53.92%	58.02%	10.59%	4.35%	5.75%
Canada	Toronto Stock Exchange	0.5627	0.1314	0.1536	0.8477	15.6242	4.7872	5.1999	16.0930	73.60%	58.14%	58.88%	16.56%	4.42%	6.44%
Chile	Santiago Stock Exchange	0.4670	-0.1014	0.0254	0.3910	4.7856	-1.2067	0.3953	4.3066	78.40%	36.80%	50.40%	32.00%	6.40%	8.00%
China	Shanghai Stock Exchange	0.7401	0.1704	0.1832	1.0936	27.2616	7.3882	6.7120	27.6141	88.10%	62.26%	61.06%	44.83%	8.89%	7.93%
China	Shenzhen Stock Exchange	0.6580	0.2537	0.0141	0.9258	7.0997	1.9486	0.0971	5.8333	84.42%	58.44%	61.20%	32.14%	8.60%	7.63%
Denmark	Copenhagen Stock Exchange	0.2398	0.1250	0.0188	0.3836	4.6464	2.9015	0.3633	3.3420	74.01%	60.45%	56.50%	18.64%	9.04%	9.04%
Egypt	Cairo Stock Exchange	0.3401	0.0196	0.0644	0.4241	5.4012	0.5062	1.5908	5.0832	69.35%	54.03%	59.68%	24.19%	3.23%	7.26%
Finland	Helsinki Stock Exchange	0.2874	0.0650	0.1041	0.4564	7.9695	1.8326	2.9858	7.4626	79.84%	62.10%	62.10%	12.90%	7.26%	8.06%
France	Euronext Paris	0.3535	0.0775	0.0922	0.5232	8.0789	1.9615	2.5115	7.8688	63.23%	53.56%	51.02%	9.54%	3.56%	3.69%
Germany	Berlin Stock Exchange	0.5335	0.0533	0.0282	0.6150	7.6464	0.7328	0.4733	5.3631	72.40%	46.64%	47.16%	22.00%	4.42%	4.04%
Germany	Stuttgart Stock Exchange	0.3809	0.0207	0.1628	0.5644	4.9032	0.2389	1.6852	3.5429	65.12%	52.91%	49.42%	5.81%	4.07%	2.91%
Germany	Munich Stock Exchange	0.8452	-0.0315	0.0234	0.8372	23.6104	-1.3237	0.4623	15.1137	81.89%	48.38%	52.14%	33.56%	3.53%	4.22%
Germany	Frankfurt Stock Exchange	0.1324	0.0187	0.4237	0.5748	1.8099	0.2260	0.7382	0.8927	57.91%	45.58%	50.70%	6.28%	2.79%	4.42%
Germany	Duesseldorf Stock Exchange	0.6183	0.1714	0.1900	0.9797	18.5940	4.8429	5.0203	15.5366	79.75%	57.32%	58.85%	27.01%	9.81%	8.92%
Greece	Athens Stock Exchange	0.4069	0.1708	0.1821	0.7599	14.1914	6.0795	6.3283	16.0838	82.53%	65.66%	66.27%	21.39%	9.64%	9.64%
Hong Kong	Hong Kong Stock Exchange	0.4981	0.1736	0.1988	0.8704	10.0003	4.0374	3.6448	10.0249	65.73%	55.36%	56.72%	10.80%	5.70%	6.04%
India	Bombay Stock Exchange	0.6388	0.1269	0.1022	0.8679	17.1064	3.5017	2.9931	13.8935	79.95%	57.99%	56.63%	20.37%	5.27%	3.83%
India	Indian National Exchange	0.4808	0.0310	-0.0140	0.4978	13.6175	1.0095	-0.4783	8.4111	83.06%	52.44%	47.23%	24.10%	3.58%	2.61%
Indonesia	Jakarta Stock Exchange	0.3223	-0.0030	0.0683	0.3876	5.8922	-0.0658	1.4380	3.7285	74.28%	52.73%	58.84%	13.18%	3.54%	4.50%
Italy	Milano Stock Exchange	0.2991	0.1239	0.0114	0.4345	5.1903	2.4192	0.1195	4.1407	68.33%	59.79%	59.79%	10.68%	7.12%	7.83%
Japan	Tokyo Stock Exchange	0.8735	0.0381	-0.0295	0.8821	29.3515	1.4055	-1.0844	17.8386	81.11%	49.09%	47.02%	39.85%	2.86%	3.28%
Japan	Osaka Stock Exchange	0.1805	-0.0097	-0.0057	0.1651	3.4167	-0.1787	-0.0776	1.3684	64.62%	51.84%	51.35%	9.34%	3.93%	3.44%
Japan	Japan Securities DAQS	0.5051	0.2050	0.1289	0.8390	8.8019	4.5940	2.5011	9.4212	69.76%	57.74%	55.74%	13.70%	4.53%	5.58%
Jordan	Amman Financial Market	0.3275	0.1699	0.1339	0.6313	3.8754	2.1876	1.2103	3.8732	68.35%	55.06%	59.49%	10.13%	5.70%	6.96%
Korea	Korea Stock Exchange	0.5816	0.1046	-0.0071	0.6791	14.0616	2.8281	-0.1925	9.2510	80.14%	54.19%	51.08%	19.59%	4.46%	3.24%
Korea	KOSDAQ	0.6810	0.1213	0.1209	0.9232	11.3186	2.1985	1.8209	7.9077	75.65%	56.64%	57.65%	19.72%	4.63%	5.84%
Malaysia	Kuala Lumpur Stock Exchange	0.6411	0.0682	0.0693	0.7785	28.7679	3.2342	3.1080	24.9045	82.61%	54.98%	55.17%	25.75%	5.36%	4.61%
Netherlands	Euronext Amsterdam	0.1557	0.0226	-0.0060	0.1722	3.2360	0.4402	-0.1145	1.5918	64.66%	44.36%	44.36%	3.01%	1.50%	0.75%
New Zealand	New Zealand Stock Exchange	0.1484	-0.0229	0.0086	0.1341	4.1958	-0.6601	0.2379	2.0429	58.88%	50.76%	51.27%	6.09%	2.03%	3.05%
Norway	Oslo Stock Exchange	0.2991	0.0620	0.0197	0.3808	3.8606	0.7177	0.2965	2.5605	67.08%	56.38%	53.50%	7.82%	4.94%	6.17%
Singapore	Stock Exchange of Singapore	0.3061	0.0544	0.0231	0.3836	6.9423	1.2542	0.5476	5.2016	65.80%	54.75%	52.15%	9.05%	4.29%	5.37%
South Africa	Johannesburg Stock Exchange	0.1515	0.1843	0.1912	0.5270	2.3770	1.5573	2.7392	3.6250	60.95%	58.05%	55.67%	9.76%	5.01%	3.43%
Spain	Barcelona Stock Exchange	0.1157	0.0453	0.0260	0.1870	3.8932	1.5864	1.0845	3.9765	69.77%	51.94%	49.61%	7.75%	6.20%	3.88%
Sweden	Stockholm Stock Exchange	0.2128	0.1726	0.1939	0.5794	3.6685	2.9473	3.2789	6.1863	68.83%	57.61%	58.60%	7.48%	3.99%	5.24%
Switzerland	CHE SWX Swiss Exchange	0.5765	0.0162	-0.0108	0.5820	10.1506	0.5661	-0.2584	7.2712	80.72%	51.51%	53.01%	26.20%	3.61%	4.82%
Taiwan	Taiwan Stock Exchange	0.5755	0.1491	0.1407	0.8653	21.5111	6.0253	5.2343	23.1134	82.81%	57.93%	58.22%	25.93%	5.48%	6.67%
Thailand	Stock Exchange of Thailand (SET)	0.2958	0.0455	0.1479	0.4893	8.8105	1.3775	4.0081	7.3286	67.12%	51.37%	61.42%	10.73%	4.57%	5.48%
United Kingdom	SETS (Electronic Trading Service)	0.8107	0.1187	0.0795	1.0089	20.8147	4.0097	3.2558	16.2112	79.79%	54.41%	55.11%	42.42%	9.64%	7.87%
United Kingdom	LSE-AIM	0.3008	0.0442	0.0278	0.3727	6.5624	1.2150	0.6385	5.3527	62.09%	51.23%	50.74%	8.22%	2.38%	2.55%
United States	New York Stock Exchange	0.8714	0.0478	0.0110	0.9301	50.3054	3.6112	0.8885	47.5567	95.08%	54.77%	50.09%	67.29%	4.07%	4.19%
United States	NASD OTC Bulletin Board	0.3853	0.2253	0.2659	0.8765	3.9359	2.1106	3.1542	5.0923	59.09%	53.94%	53.28%	5.48%	4.31%	3.98%
United States	American Stock Exchange	0.4215	0.2023	0.2532	0.8770	9.1916	4.5946	4.6613	9.4894	71.91%	60.12%	61.89%	18.66%	8.84%	7.66%
United States	Nasdaq	0.8896	0.0058	0.0079	0.9033	45.4368	0.4983	0.5717	33.0018	86.63%	48.93%	48.49%	45.30%	3.56%	3.67%

Table 16: Results for estimation of commonality in liquidity for individual stocks using Equation 1: Percentage change in spread is regressed on equally weighted average of percentage change in spread for the market and equally weighted market return.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.0081	0.0031	-0.0108	0.0004	1.2901	0.5559	-1.8648	0.0359	50.65%	47.61%	46.57%	3.43%	3.03%	2.49%
Austria	Vienna Stock Exchange	0.0211	-0.0157	-0.0464	-0.0410	0.5778	-0.6890	-1.2459	-0.7434	48.89%	36.67%	45.56%	7.78%	1.11%	2.22%
Belgium	Euronext Brussels	0.0397	0.0177	0.0296	0.0870	2.1960	0.8640	1.6051	2.3285	62.30%	51.31%	51.83%	4.19%	5.24%	3.14%
Canada	TSX Venture Exchange	0.1798	0.1076	0.1134	0.4007	14.5533	8.0881	8.8309	17.5913	65.42%	60.67%	60.42%	9.10%	5.80%	6.45%
Canada	Toronto Stock Exchange	0.0698	0.0267	0.0173	0.1138	10.8575	4.8130	3.5144	10.1334	62.83%	57.77%	56.21%	9.94%	6.53%	6.16%
Chile	Santiago Stock Exchange	0.1939	-0.0073	-0.0101	0.1765	5.5853	-0.5995	-0.6724	4.0970	76.80%	49.60%	46.40%	37.60%	3.20%	1.60%
China	Shanghai Stock Exchange	0.4122	0.2193	0.1756	0.8072	24.2260	12.6708	10.5186	25.4477	85.46%	70.43%	67.43%	27.88%	10.82%	9.50%
China	Shenzhen Stock Exchange	0.4534	0.2727	0.1511	0.8772	6.6758	3.9508	2.2994	8.0772	81.49%	67.69%	66.56%	25.97%	12.99%	6.17%
Denmark	Copenhagen Stock Exchange	0.0228	0.0061	-0.0305	-0.0017	0.9817	0.3173	-1.5998	-0.0386	55.93%	49.72%	44.07%	4.52%	2.26%	1.69%
Egypt	Cairo Stock Exchange	0.0696	0.0257	0.0060	0.1013	4.4514	1.7426	0.5068	3.5643	62.90%	47.58%	54.84%	12.90%	4.84%	3.23%
Finland	Helsinki Stock Exchange	0.0268	-0.0060	-0.0047	0.0161	2.0148	-0.5789	-0.3050	0.9625	45.16%	50.00%	48.39%	4.84%	1.61%	3.23%
France	Euronext Paris	0.0315	0.0110	0.0034	0.0459	3.7017	1.2911	0.4309	3.3222	48.22%	44.15%	46.44%	5.47%	4.83%	4.07%
Germany	Berlin Stock Exchange	0.1319	0.0280	0.0902	0.2500	3.9458	0.5796	1.9805	2.5040	63.59%	53.57%	50.16%	9.47%	4.18%	4.35%
Germany	Stuttgart Stock Exchange	0.0834	0.0014	0.0361	0.1208	2.3002	0.0348	0.9708	1.5654	52.91%	47.67%	50.58%	3.49%	6.98%	4.65%
Germany	Munich Stock Exchange	0.5709	0.0203	0.1257	0.7168	21.1753	1.0367	2.0340	9.1061	76.97%	49.71%	54.86%	30.67%	3.53%	5.27%
Germany	Frankfurt Stock Exchange	0.0591	-0.0411	0.0237	0.0416	2.2953	-1.3092	1.0568	0.7888	54.19%	43.72%	53.49%	4.88%	2.09%	4.19%
Germany	Duesseldorf Stock Exchange	0.4568	0.2707	0.3022	1.0297	21.3039	10.1106	5.0789	15.1334	80.13%	73.25%	70.06%	30.06%	18.22%	14.78%
Greece	Athens Stock Exchange	0.0691	0.0461	0.0266	0.1417	7.2242	4.6810	3.0990	7.6296	69.88%	64.16%	56.33%	7.83%	5.72%	4.22%
Hong Kong	Hong Kong Stock Exchange	0.1076	0.0940	0.0818	0.2834	3.9850	4.3818	3.2314	5.8370	58.76%	57.65%	55.19%	7.23%	5.70%	6.21%
India	Bombay Stock Exchange	0.0383	0.0064	-0.0170	0.0277	3.0620	0.5729	-1.5225	1.2437	57.43%	49.60%	41.53%	4.87%	3.43%	2.56%
India	Indian National Exchange	0.1237	-0.0134	-0.0197	0.0905	9.6103	-1.1290	-1.8677	4.2347	73.62%	41.37%	40.39%	15.31%	2.93%	1.95%
Indonesia	Jakarta Stock Exchange	-0.0431	0.0435	0.0281	0.0285	-0.7039	1.5203	0.7009	0.4474	48.55%	50.48%	49.52%	3.22%	2.89%	4.82%
Italy	Milano Stock Exchange	0.1240	0.0491	0.0565	0.2297	4.1447	1.9379	2.4155	5.2441	60.85%	57.65%	51.60%	12.10%	6.05%	7.12%
Japan	Tokyo Stock Exchange	0.1336	-0.0126	-0.0428	0.0782	9.9148	-0.6930	-2.3670	2.2070	69.02%	43.74%	43.44%	13.67%	2.61%	2.37%
Japan	Osaka Stock Exchange	0.0174	-0.0123	0.0386	0.0437	0.7460	-0.3331	0.4834	0.5122	57.25%	47.17%	46.68%	5.65%	2.70%	3.44%
Japan	Japan Securities DAQS	0.1432	0.0697	0.0866	0.2994	8.1169	4.3646	4.5253	8.4616	64.28%	57.74%	57.64%	7.59%	5.06%	7.17%
Jordan	Amman Financial Market	0.0811	0.0063	0.0574	0.1448	3.9774	0.4337	2.0266	4.2843	62.66%	51.27%	58.86%	8.23%	3.80%	10.13%
Korea	Korea Stock Exchange	0.1167	0.0340	-0.0144	0.1362	4.7246	1.9548	-0.9042	3.8280	61.35%	50.14%	45.81%	13.24%	4.59%	4.05%
Korea	KOSDAQ	0.3185	0.0777	0.1244	0.5207	4.8963	1.6818	2.0035	4.1213	70.02%	56.74%	58.95%	12.47%	5.63%	6.34%
Malaysia	Kuala Lumpur Stock Exchange	0.2638	0.0693	0.0843	0.4173	12.8894	3.4334	3.9760	11.0819	70.11%	56.48%	55.83%	12.50%	7.61%	6.95%
Netherlands	Euronext Amsterdam	0.0096	0.0078	-0.0038	0.0136	0.8369	0.5891	-0.4084	0.8482	51.13%	44.36%	57.14%	3.01%	3.01%	1.50%
New Zealand	New Zealand Stock Exchange	0.0038	-0.0073	-0.0081	-0.0115	0.7967	-1.5532	-1.8592	-1.4581	50.76%	43.15%	44.67%	2.54%	3.55%	2.03%
Norway	Oslo Stock Exchange	0.0149	0.0305	-0.0575	-0.0121	0.3454	0.7005	-1.7123	-0.1546	55.56%	47.33%	44.44%	4.12%	2.06%	1.23%
Singapore	Stock Exchange of Singapore	0.0345	0.0513	0.0538	0.1396	1.2345	2.3565	1.8819	2.6398	53.68%	56.44%	51.99%	3.99%	3.53%	5.37%
South Africa	Johannesburg Stock Exchange	0.0239	0.0008	-0.0062	0.0185	2.2751	0.0445	-0.4793	0.6091	53.56%	54.35%	51.19%	7.12%	3.96%	5.28%
Spain	Barcelona Stock Exchange	0.0388	0.0089	0.0409	0.0886	2.1839	0.4504	2.2016	2.5049	59.69%	45.74%	55.81%	6.20%	6.20%	5.43%
Sweden	Stockholm Stock Exchange	0.0597	0.0362	0.0619	0.1578	1.9822	1.0434	1.9438	2.4069	57.11%	50.87%	55.86%	4.24%	3.49%	2.99%
Switzerland	CHE SWX Swiss Exchange	0.2598	0.0240	0.0248	0.3086	7.5004	1.6193	1.2848	6.8603	67.47%	50.30%	53.92%	21.99%	4.22%	6.02%
Taiwan	Taiwan Stock Exchange	0.5444	0.2546	0.2685	1.0675	20.6304	9.9165	10.4404	22.9662	83.85%	64.15%	64.89%	27.26%	9.33%	11.26%
Thailand	Stock Exchange of Thailand (SET)	0.1441	0.0695	0.0670	0.2806	3.1380	1.5704	1.7096	3.5746	58.68%	51.37%	55.94%	5.94%	4.11%	4.11%
United Kingdom	SETS (Electronic Trading Service)	0.0932	0.0306	0.0097	0.1335	12.1305	3.5968	1.3317	8.9979	64.04%	52.88%	48.18%	15.04%	7.17%	4.94%
United Kingdom	LSE-AIM	0.0341	0.0307	0.0098	0.0746	2.2406	1.7974	0.6443	2.3016	54.28%	49.75%	50.99%	2.96%	2.71%	2.22%
United States	New York Stock Exchange	0.5576	0.1916	0.1513	0.9005	33.8140	16.1299	13.9736	33.5027	92.10%	70.15%	67.60%	48.69%	11.85%	8.57%
United States	NASD OTC Bulletin Board	0.0147	0.0031	0.0297	0.0475	1.2334	0.2299	2.2909	2.2320	51.55%	51.45%	48.17%	5.39%	4.97%	5.01%
United States	American Stock Exchange	0.0893	0.0386	0.0390	0.1669	4.0645	4.7400	4.9424	6.6417	67.19%	60.31%	64.24%	16.70%	10.22%	9.43%
United States	Nasdaq	0.3956	0.0732	0.0813	0.5501	22.7115	4.8913	6.3401	15.2203	81.84%	58.92%	59.06%	31.02%	6.14%	6.32%

Table 17: Results for estimation of commonality in liquidity for individual stocks using Equation 2: Percentage change in spread is regressed on value weighted average of percentage change in spread for the market and value weighted market return.

In the same table we also note that the levels of correlations are much lower and t-statistics are not significant for greater number of exchanges. While we observed 0.8714 as concurrent mean coefficient for NYSE with equally weighted market variables, this is reduced to 0.5576 with value weighted market variables.

Using first difference for liquidity measures

Table 18 reports the results for the estimation of (Equation 3) commonality in liquidity using first difference of spread and equally weighted market variables. Based on the previous discussion about the possible bias in using percentage change in liquidity measure, we expect to have different results (compared to Table 16). We do not necessarily expect to have higher or lower commonality levels. We do however, expect to have bigger differences for exchanges where liquidity would have higher variance, and thus more prone to the bias.

The differences of results between Table 18 and Table 16 are significant. For NYSE, the level of commonality is reduced to 41.88% from 67.29%. The mean concurrent coefficient is also reduced from 0.8714 to 0.5638. The only difference between the estimations of Table 18 (Equation 3) and Table 16 (Equation 1) is the use of first difference for change in liquidity instead of percentage daily change. Similar differences are apparent in most other exchanges. However, contrary to our expectations, the level of difference is not uniformly greater for exchanges with higher variance of liquidity.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.2538	0.0333	0.0139	0.3010	4.7453	1.1347	0.4927	4.6532	60.93%	51.44%	48.46%	8.75%	4.82%	3.98%
Austria	Vienna Stock Exchange	0.0873	0.0285	0.0605	0.1763	1.5080	0.5003	0.9870	1.0731	50.00%	54.44%	48.89%	5.56%	3.33%	3.33%
Belgium	Euronext Brussels	0.0112	0.1012	0.0788	0.1912	0.2663	1.6255	2.1273	2.3980	55.50%	57.07%	57.07%	1.57%	4.71%	2.09%
Canada	TSX Venture Exchange	0.2521	0.0202	0.1018	0.3741	3.6321	0.5256	2.1291	4.5435	59.27%	50.87%	53.52%	9.00%	5.40%	6.25%
Canada	Toronto Stock Exchange	0.2074	0.0193	-0.0144	0.2124	3.2039	0.3301	-0.2510	3.2570	65.23%	53.54%	52.16%	5.34%	2.94%	2.67%
Chile	Santiago Stock Exchange	-0.0338	0.0317	-0.0208	-0.0229	-0.8591	0.9618	-0.9498	-0.8042	54.40%	48.80%	47.20%	12.00%	3.20%	9.60%
China	Shanghai Stock Exchange	0.3985	-0.0073	-0.1315	0.2598	16.7946	-0.3989	-6.5924	8.5256	81.13%	49.16%	37.62%	24.16%	5.53%	1.80%
China	Shenzhen Stock Exchange	0.3095	0.0345	-0.1069	0.2370	2.8284	0.4994	-1.2542	1.9482	75.16%	50.32%	44.97%	17.86%	5.36%	3.41%
Denmark	Copenhagen Stock Exchange	0.1075	0.0806	-0.0588	0.1293	2.0468	1.1289	-1.1361	1.7264	64.41%	55.37%	47.46%	7.34%	5.65%	6.21%
Egypt	Cairo Stock Exchange	0.1921	-0.0638	0.1221	0.2505	2.8788	-0.8154	0.9625	1.2388	69.35%	46.77%	46.77%	14.52%	5.65%	8.87%
Finland	Helsinki Stock Exchange	0.0318	0.0025	-0.0289	0.0055	1.0546	0.1547	-1.7114	0.1145	63.71%	51.61%	54.03%	12.10%	4.03%	2.42%
France	Euronext Paris	0.1898	0.0371	-0.0349	0.1919	3.4852	1.2226	-0.6694	2.4400	59.92%	51.53%	51.15%	6.11%	3.94%	3.44%
Germany	Berlin Stock Exchange	-0.4040	-0.0048	0.2163	-0.1926	-1.0087	-0.1422	1.1610	-0.9205	57.81%	50.26%	49.81%	5.01%	3.38%	3.48%
Germany	Stuttgart Stock Exchange	0.3618	-0.0749	-0.0046	0.2823	4.6507	-0.7819	-0.0643	2.0384	65.12%	58.14%	53.49%	2.91%	2.33%	1.74%
Germany	Munich Stock Exchange	0.6007	-0.2127	-0.2356	0.1524	3.0686	-2.5694	-0.7856	0.6466	67.71%	46.76%	51.50%	13.37%	4.80%	6.19%
Germany	Frankfurt Stock Exchange	0.0200	-0.2334	-0.3371	-0.5505	0.0977	-1.4466	-1.0746	-1.0330	51.86%	49.07%	49.30%	3.26%	3.26%	2.09%
Germany	Duesseldorf Stock Exchange	0.2817	0.1190	-0.0515	0.3493	3.6844	1.2105	-0.6762	2.6678	65.86%	51.46%	51.21%	16.69%	8.41%	7.64%
Greece	Athens Stock Exchange	0.0390	0.0574	0.0517	0.1482	1.3326	2.4109	1.3623	3.2679	59.64%	55.42%	53.61%	10.84%	10.24%	5.72%
Hong Kong	Hong Kong Stock Exchange	0.1366	-0.1001	-0.0053	0.0312	2.0144	-1.7802	-0.1228	0.6872	54.34%	47.62%	51.19%	3.32%	4.00%	4.17%
India	Bombay Stock Exchange	0.1910	-0.0344	-0.0235	0.1331	4.2009	-0.7136	-1.2184	2.5209	66.37%	47.04%	44.97%	11.74%	4.63%	4.47%
India	Indian National Exchange	0.2685	-0.0510	-0.1357	0.0818	6.9653	-1.2522	-2.8932	0.9537	78.18%	46.58%	34.53%	33.55%	7.49%	5.21%
Indonesia	Jakarta Stock Exchange	-0.0281	-0.0649	0.1395	0.0464	-0.3619	-1.2053	0.9137	0.3358	53.70%	46.95%	49.84%	5.47%	3.54%	2.25%
Italy	Milano Stock Exchange	0.3294	-0.0467	-0.1939	0.0888	3.6994	-0.7910	-2.6509	0.9142	64.41%	46.98%	46.62%	10.68%	3.91%	2.49%
Japan	Tokyo Stock Exchange	0.4066	0.0899	0.0141	0.5105	3.8224	1.3744	0.1774	2.9814	64.28%	52.31%	47.14%	5.89%	3.16%	3.04%
Japan	Osaka Stock Exchange	-0.3456	-0.2293	0.1235	-0.4514	-1.6134	-1.9949	0.7231	-1.6835	54.79%	47.42%	52.33%	3.19%	1.97%	2.21%
Japan	Japan Securities DAQS	0.1778	0.0333	0.0333	0.2444	3.5786	0.5722	0.5737	2.4778	58.80%	52.69%	52.58%	5.80%	4.11%	3.58%
Jordan	Amman Financial Market	-0.0811	-0.0166	-0.2028	-0.3005	-0.8772	-0.1785	-1.5062	-1.7618	51.90%	48.10%	51.90%	7.59%	5.70%	3.16%
Korea	Korea Stock Exchange	0.1313	0.0112	0.0315	0.1741	4.1118	0.3204	0.8282	3.9328	63.78%	53.11%	45.14%	11.62%	6.76%	3.92%
Korea	KOSDAQ	0.0377	-0.0798	-0.0310	-0.0732	0.7999	-1.6649	-0.5861	-1.1408	58.25%	48.19%	47.89%	7.55%	4.12%	4.43%
Malaysia	Kuala Lumpur Stock Exchange	0.3149	0.0046	0.0164	0.3359	12.9474	0.2648	0.7391	10.8725	73.21%	49.91%	50.09%	18.80%	5.92%	5.17%
Netherlands	Euronext Amsterdam	0.0360	-0.0021	0.1846	0.2184	0.2050	-0.0253	0.8431	0.9062	52.63%	51.13%	41.35%	6.02%	2.26%	3.01%
New Zealand	New Zealand Stock Exchange	0.1164	-0.0169	0.0293	0.1288	2.5440	-0.2975	0.6246	1.2987	60.91%	44.67%	53.81%	5.58%	4.06%	3.55%
Norway	Oslo Stock Exchange	0.0013	0.0044	0.0163	0.0220	0.0450	0.2465	0.9883	0.5775	55.14%	48.56%	51.03%	1.23%	2.47%	2.88%
Singapore	Stock Exchange of Singapore	0.3588	0.0997	0.2112	0.6697	1.2556	1.5109	1.0507	1.2217	57.21%	52.91%	50.61%	7.36%	2.61%	5.67%
South Africa	Johannesburg Stock Exchange	0.0689	0.1257	0.4310	0.6256	2.1448	1.1339	1.0540	1.2052	61.48%	48.02%	51.98%	3.17%	4.75%	3.43%
Spain	Barcelona Stock Exchange	0.1324	0.0356	-0.0445	0.1236	2.5689	1.5066	-1.0638	2.4907	65.89%	54.26%	52.71%	7.75%	4.65%	5.43%
Sweden	Stockholm Stock Exchange	0.0342	-0.0318	-0.0198	-0.0174	0.5685	-1.0702	-0.6497	-0.2381	58.10%	54.36%	52.62%	7.73%	5.74%	6.23%
Switzerland	CHE SWX Swiss Exchange	0.1583	-0.0176	-0.0239	0.1168	3.9276	-0.4690	-1.1032	3.2962	75.30%	44.28%	43.07%	17.47%	5.12%	2.71%
Taiwan	Taiwan Stock Exchange	0.2018	-0.1301	-0.1394	-0.0677	3.7691	-1.7149	-2.1201	-0.6535	67.70%	48.74%	42.81%	7.85%	3.26%	2.37%
Thailand	Stock Exchange of Thailand (SET)	0.0711	-0.0162	0.0111	0.0660	2.9044	-0.5756	0.5049	1.8869	54.57%	48.40%	55.25%	2.97%	3.88%	3.88%
United Kingdom	SETS (Electronic Trading Service)	0.2647	0.0150	0.0086	0.2882	5.9694	0.4772	0.2240	4.0251	65.80%	48.30%	45.83%	9.28%	4.35%	3.29%
United Kingdom	LSE-AIM	0.1257	-0.0223	-0.0840	0.0194	2.2826	-0.4618	-1.9856	0.2021	57.32%	49.92%	49.59%	5.67%	4.03%	3.78%
United States	New York Stock Exchange	0.5638	-0.0108	-0.0989	0.4542	28.4791	-0.5570	-6.7259	14.4563	91.91%	45.23%	36.90%	41.88%	2.31%	1.58%
United States	NASD OTC Bulletin Board	0.2246	-0.0250	-0.2294	-0.0298	1.9788	-0.1658	-1.2900	-0.1162	52.86%	50.61%	51.64%	7.22%	6.19%	6.47%
United States	American Stock Exchange	0.2210	-0.1346	-0.0477	0.0387	1.4344	-0.7818	-0.2768	0.1866	54.81%	51.47%	55.80%	5.70%	3.73%	6.68%
United States	Nasdaq	0.4213	-0.0067	-0.0142	0.4003	11.5699	-0.2146	-0.3350	4.5685	79.51%	44.06%	43.77%	21.50%	4.54%	4.50%

Table 18: Results for estimation of commonality in liquidity for individual stocks using Equation 3: First difference of spread is regressed on equally weighted average of first difference of spread for the market and equally weighted market return.

Table 19 reports the results for the estimation of (Equation 4) commonality in liquidity using first difference of spread and value weighted market variables. These results are comparable to results presented in Table 17. The only difference between the two estimations is again the use of first difference instead of percentage change. With the use of value weighted market variables, the impact of the bias is more visible. The 48.69% commonality for NYSE is reduced to 15.14%. The mean concurrent coefficient is reduced to 0.1827 from 0.5576. Most other markets have similar reductions in levels and correlations. We also note that this pattern is not uniform. Table 19 (Equation 4) is the basis for our further analysis. Thus, most of the results that will be presented in later sections will be compared to the results provided in Table 19.

The last column of Table 19 reports the mean correlation coefficient for the cross-sectional residuals within each equity markets. Pair-wise correlation coefficient is calculated between all possible combinations of residuals. Mean value of these correlation coefficients for each exchange is reported in this last column. In a way, it is a test for the reliability of results for each exchange. While some exchanges have more than 10% mean coefficients, overall the results lead us to conclude that cross-sectional correlation of residuals between different stocks does not constitute a major problem.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead	Corr. of
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant			Residuals
Australia	Nationall Automated Trading	0.0242	0.0050	0.0029	0.0321	2.4098	1.2909	0.6254	3.4927	55.91%	52.53%	51.24%	7.01%	4.97%	4.42%	0.0313
Austria	Vienna Stock Exchange	0.0251	-0.0361	-0.0234	-0.0344	0.9992	-1.1956	-0.8227	-0.9512	57.78%	48.89%	48.89%	5.56%	4.44%	2.22%	0.0446
Belgium	Euronext Brussels	0.0465	0.0510	-0.0299	0.0676	0.7845	0.9545	-0.9232	0.7989	64.92%	54.97%	50.26%	7.33%	2.09%	5.76%	0.0290
Canada	TSX Venture Exchange	0.0071	-0.0043	0.0047	0.0075	0.8886	-0.9359	1.0724	0.6018	54.87%	52.02%	51.52%	5.45%	5.10%	5.50%	0.0397
Canada	Toronto Stock Exchange	0.0313	0.0131	0.0134	0.0579	1.1899	0.3247	0.5214	0.7560	59.52%	54.55%	48.57%	9.48%	4.97%	3.13%	0.0841
Chile	Santiago Stock Exchange	0.0129	0.2521	-0.3932	-0.1282	0.6455	0.9350	-1.0199	-0.9760	65.60%	48.00%	48.80%	12.00%	1.60%	2.40%	0.0659
China	Shanghai Stock Exchange	0.1042	0.0235	-0.0485	0.0791	9.2943	2.0133	-3.4120	4.4656	69.71%	50.96%	40.50%	8.89%	6.49%	3.13%	0.0872
China	Shenzhen Stock Exchange	0.1661	0.0775	-0.0763	0.1672	1.9685	0.8922	-1.0725	2.2062	68.34%	51.14%	46.75%	8.93%	5.03%	2.76%	0.0247
Denmark	Copenhagen Stock Exchange	0.5291	0.3346	-0.0314	0.8324	1.8547	2.1418	-0.2438	2.4360	59.32%	55.37%	47.46%	7.34%	6.21%	5.08%	0.0126
Egypt	Cairo Stock Exchange	0.0696	-0.0275	0.0403	0.0825	2.6816	-0.4574	1.2160	1.2818	65.32%	50.81%	50.81%	12.10%	8.87%	8.87%	0.0466
Finland	Helsinki Stock Exchange	0.0181	0.0428	-0.0147	0.0462	0.6720	1.6055	-0.5486	0.9110	55.65%	52.42%	46.77%	2.42%	4.03%	4.84%	0.0539
France	Euronext Paris	-0.0165	0.0118	-0.0300	-0.0346	-1.0141	1.2283	-1.5530	-1.1654	57.25%	50.89%	49.36%	3.05%	2.67%	3.05%	0.0173
Germany	Berlin Stock Exchange	0.7363	-0.0159	0.9599	1.6804	1.0381	-0.5543	0.9919	1.0037	54.86%	50.68%	46.26%	4.77%	4.84%	3.86%	0.0638
Germany	Stuttgart Stock Exchange	0.1771	-0.0235	0.0237	0.1773	3.2979	-0.6931	0.6787	2.1673	59.88%	48.26%	56.40%	4.65%	0.58%	4.07%	0.0342
Germany	Munich Stock Exchange	0.2794	-0.0433	-0.4698	-0.2337	1.6756	-1.1150	-0.9585	-0.7487	59.78%	48.96%	49.54%	12.21%	8.62%	8.56%	0.0446
Germany	Frankfurt Stock Exchange	-0.1272	-0.0007	0.0257	-0.1022	-1.3442	-0.0399	0.9049	-1.2427	48.84%	45.12%	52.09%	1.63%	3.02%	2.33%	0.0165
Germany	Duesseldorf Stock Exchange	0.0239	0.0380	0.0045	0.0665	1.7860	1.6627	0.3481	1.8332	56.18%	54.52%	49.17%	11.85%	11.08%	9.43%	0.0252
Greece	Athens Stock Exchange	0.0336	0.0091	0.0369	0.0796	1.3121	0.6789	1.9047	3.3797	65.06%	54.52%	53.31%	9.04%	6.33%	5.72%	0.0858
Hong Kong	Hong Kong Stock Exchange	0.0016	-0.0041	0.0003	-0.0022	0.9586	-1.9378	0.2136	-0.9986	50.85%	49.57%	50.43%	1.45%	2.38%	2.55%	0.0829
India	Bombay Stock Exchange	0.0644	-0.0239	-0.0144	0.0261	2.6118	-0.7517	-1.1496	1.4525	61.26%	50.40%	45.05%	9.66%	6.47%	4.55%	0.0828
India	Indian National Exchange	0.1239	0.0165	-0.0350	0.1054	6.1996	1.1273	-1.7319	4.1369	73.94%	51.79%	43.97%	27.36%	9.45%	8.79%	0.0718
Indonesia	Jakarta Stock Exchange	-0.3626	-0.2290	-0.0799	-0.6715	-1.1150	-0.7008	-0.4274	-0.9881	50.48%	52.41%	53.38%	4.82%	4.18%	4.50%	0.0834
Italy	Milano Stock Exchange	0.0415	-0.0095	-0.0270	0.0050	2.5783	-0.8437	-2.1280	0.2274	53.74%	47.33%	45.55%	7.12%	2.49%	1.78%	0.0420
Japan	Tokyo Stock Exchange	0.0098	0.0619	0.0812	0.1529	0.1538	1.1671	1.6681	1.7681	60.75%	52.73%	47.08%	6.26%	3.58%	2.55%	0.0638
Japan	Osaka Stock Exchange	0.0818	0.0388	-0.0328	0.0877	1.9215	0.4495	-1.2156	0.9217	51.35%	51.11%	50.37%	1.97%	2.21%	3.44%	0.0648
Japan	Japan Securities DAQS	0.0287	-0.0044	0.0062	0.0305	1.7814	-0.3948	0.3750	1.0717	54.69%	52.90%	50.90%	3.48%	2.63%	3.16%	0.0514
Jordan	Amman Financial Market	0.0303	-0.0143	0.0157	0.0317	1.0423	-0.7806	0.8888	0.7771	48.73%	51.27%	56.96%	1.90%	4.43%	1.90%	0.0433
Korea	Korea Stock Exchange	0.0043	0.0018	0.0063	0.0124	2.2655	0.6214	1.5371	2.1541	57.03%	51.62%	45.68%	9.59%	7.97%	5.81%	0.0811
Korea	KOSDAQ	-0.0183	-0.0112	-0.0144	-0.0440	-1.5323	-0.7362	-1.0376	-1.9511	49.50%	48.59%	50.91%	3.72%	3.82%	3.72%	0.0853
Malaysia	Kuala Lumpur Stock Exchange	0.0373	0.0033	0.0102	0.0507	3.9984	0.3065	1.1589	2.5587	58.74%	53.95%	50.00%	7.24%	6.02%	4.70%	0.0195
Netherlands	Euronext Amsterdam	-0.0058	0.0171	0.0224	0.0336	-0.3181	1.0785	0.8573	1.2836	42.86%	51.88%	42.11%	3.76%	4.51%	2.26%	0.0877
New Zealand	New Zealand Stock Exchange	-0.0022	-0.0005	-0.0002	-0.0030	-0.6112	-0.1547	-0.0919	-0.4638	52.28%	46.19%	50.25%	4.06%	2.54%	2.54%	0.0579
Norway	Oslo Stock Exchange	-0.0166	0.0514	-0.0607	-0.0259	-0.4759	1.6772	-1.5012	-0.4770	56.79%	51.85%	51.03%	5.35%	4.12%	4.12%	0.0169
Singapore	Stock Exchange of Singapore	0.0232	0.0078	0.0138	0.0448	0.7886	1.2853	1.1902	1.0513	49.08%	54.14%	52.45%	1.69%	3.83%	3.99%	0.0354
South Africa	Johannesburg Stock Exchange	-0.1061	-0.1203	-0.0627	-0.2891	-0.9188	-1.0816	-1.0529	-1.0142	53.56%	47.49%	50.13%	3.43%	3.69%	2.11%	0.0850
Spain	Barcelona Stock Exchange	0.0449	0.0099	-0.0178	0.0370	3.5261	1.0923	-1.5446	2.6518	58.91%	52.71%	59.69%	8.53%	9.30%	1.55%	0.0658
Sweden	Stockholm Stock Exchange	0.0559	-0.0689	-0.0985	-0.1114	2.2731	-1.0901	-1.2638	-0.8336	54.11%	54.11%	49.63%	7.23%	8.23%	7.98%	0.0648
Switzerland	CHE SWX Swiss Exchange	0.1798	0.0069	-0.0286	0.1581	3.2213	0.3488	-0.8203	3.1645	76.81%	50.60%	43.07%	25.90%	3.01%	3.92%	0.0718
Taiwan	Taiwan Stock Exchange	0.0824	-0.0525	0.0105	0.0404	1.9130	-1.3919	0.5519	0.6950	59.41%	51.41%	50.37%	4.44%	3.70%	3.70%	0.0897
Thailand	Stock Exchange of Thailand (SET)	0.0855	0.0691	0.0383	0.1929	2.1057	2.1877	1.3384	2.4436	52.51%	53.20%	56.85%	4.11%	3.42%	3.65%	0.0224
United Kingdom	SETS (Electronic Trading Service)	0.0414	0.0174	-0.0084	0.0504	3.1718	1.5461	-1.1185	2.3066	56.76%	47.47%	49.94%	7.05%	6.11%	3.76%	0.0193
United Kingdom	LSE-AIM	0.0081	0.0133	-0.0182	0.0033	1.2194	1.5528	-1.4245	0.2508	52.96%	50.82%	50.82%	4.52%	4.85%	3.54%	0.0502
United States	New York Stock Exchange	0.1827	-0.0149	-0.0404	0.1274	9.4867	-1.2226	-2.6923	4.8623	74.10%	47.60%	39.45%	15.14%	4.19%	2.86%	0.0414
United States	NASD OTC Bulletin Board	0.0168	0.0094	-0.0031	0.0231	0.7191	0.7092	-0.1919	0.5101	49.72%	49.16%	49.67%	4.50%	4.64%	4.45%	0.0642
United States	American Stock Exchange	0.0449	-0.0016	-0.0367	0.0065	1.1150	-0.2134	-0.8811	0.5543	52.26%	51.08%	53.63%	6.29%	4.52%	7.07%	0.0258
United States	Nasdaq	0.1702	0.0100	0.0333	0.2134	6.0240	0.2149	0.9768	2.7560	60.92%	48.13%	48.38%	9.15%	6.50%	6.72%	0.0798

Table 19: Results for estimation of commonality in liquidity for individual stocks using Equation 4: First difference of spread is regressed on value weighted average of first difference of spread for the market and value weighted market return.

Table 20 reports the results for the estimation of (Equation 4) commonality in liquidity using first difference of spread and value weighted market variables by size quintiles. By using equally weighted market variables, most of the evidence in previous literature points to size as a characteristic for commonality. It is almost customary to present commonality results in size quintiles. However, by using value weighted market variables, we account for some of the impact that size has on commonality. Thus, we do not expect to have as crisp patterns of difference between small size quintiles and large size quintiles. To conserve space, we presend on the mean of sum of coefficients for different size quintiles. In overall results, we do not see any apparent patterns.

		Sum for Q1		Sum for Q2		Sum for Q3		Sum for Q4		Sum for Q5	
Country	Exchange	Mean Cff.	t-Statistic	Mean Cff.	t-Statistic	Mean Cff.	t-Statistic	Mean Cff.	t-Statistic	Mean Cff.	t-Statistic
Australia	Nationall Automated Trading	0.0004	0.0505	0.0098	1.0464	0.0111	1.9049	0.0497	1.6151	0.0899	2.8594
Austria	Vienna Stock Exchange	-0.0090	-0.2663	-0.1733	-1.2560	0.0439	0.9688	-0.0681	-0.9786	0.0368	0.4667
Belgium	Euronext Brussels	0.2497	1.7415	-0.3227	-1.5055	0.2923	0.9504	-0.0626	-0.6089	0.2010	2.2767
Canada	TSX Venture Exchange	0.0290	2.0915	0.0167	1.5353	0.0305	1.5229	0.0023	0.2016	-0.0407	-0.7418
Canada	Toronto Stock Exchange	0.1545	2.6518	-0.0288	-0.5173	-0.2377	-0.6614	0.1295	2.3534	0.2701	2.8095
Chile	Santiago Stock Exchange	-0.7856	-1.2283	-0.0848	-1.2503	0.0173	0.8824	0.0594	2.3674	0.1586	1.9385
China	Shanghai Stock Exchange	0.0600	1.5999	0.0705	2.1884	0.0958	2.9277	0.0367	0.9531	0.1343	2.4777
China	Shenzhen Stock Exchange	0.3422	2.1232	0.1471	1.6713	0.1833	0.5686	0.1603	4.2051	-0.0020	-0.0259
Denmark	Copenhagen Stock Exchange	2.8894	1.8899	1.2768	2.4975	-0.2937	-1.0244	0.1540	1.1376	0.1087	0.9299
Egypt	Cairo Stock Exchange	-0.0187	-0.2571	0.0460	1.6648	0.1819	0.6546	-0.0002	-0.0023	0.2019	1.6336
Finland	Helsinki Stock Exchange	-0.0580	-0.6571	-0.0802	-1.3253	-0.0189	-0.3889	0.2467	1.1562	0.1453	2.7546
France	Euronext Paris	-0.0211	-0.4825	-0.0436	-0.5326	0.0244	0.4077	-0.0928	-1.0354	-0.0390	-0.9009
Germany	Berlin Stock Exchange	0.0202	0.3338	-0.0402	-0.6359	0.0058	0.1202	0.0632	1.3465	8.2470	0.9980
Germany	Stuttgart Stock Exchange	-0.1871	-1.6762	0.1520	1.6564	0.1013	1.2079	0.5019	1.5404	0.2797	1.6004
Germany	Munich Stock Exchange	0.0980	0.6312	-0.2528	-0.9466	-1.4352	-0.9493	0.1688	1.7439	0.2538	1.2733
Germany	Frankfurt Stock Exchange	-0.3319	-0.9463	-0.0109	-0.3682	0.0100	0.7776	-0.0004	-0.0600	-0.1707	-0.8455
Germany	Duesseldorf Stock Exchange	-0.0053	-0.1812	0.0022	0.1731	0.0155	0.1545	0.2392	1.7821	0.0773	1.3290
Greece	Athens Stock Exchange	0.0497	0.8977	0.0864	1.3454	0.0569	1.1884	0.1331	2.5727	0.0723	1.7093
Hong Kong	Hong Kong Stock Exchange	-0.0006	-0.3573	0.0013	0.5273	0.0005	0.3251	-0.0060	-1.4300	-0.0065	-0.6554
India	Bombay Stock Exchange	0.0122	0.2898	0.0586	2.7740	0.0523	1.6573	0.0700	1.4820	-0.0627	-1.2283
India	Indian National Exchange	0.0177	0.9192	0.0347	0.6181	0.0828	1.3305	0.1413	2.1282	0.2512	3.9638
Indonesia	Jakarta Stock Exchange	-1.2713	-1.1506	-0.5450	-0.8614	0.4166	0.4515	-1.9533	-0.6561	0.0335	0.7518
Italy	Milano Stock Exchange	-0.0806	-1.0025	0.0378	0.8915	-0.0107	-1.1536	-0.0046	-0.7033	0.0810	1.3155
Japan	Tokyo Stock Exchange	0.0809	0.3212	-0.0233	-0.1148	0.5061	2.7352	0.1151	0.5255	0.0802	1.8040
Japan	Osaka Stock Exchange	-0.0488	-1.0514	0.3241	1.0015	-0.0213	-0.4519	0.1989	0.9015	-0.0120	-0.0419
Japan	Japan Securities DAQS	-0.0287	-0.6111	0.0419	0.7971	0.0593	1.1405	0.0698	0.6602	0.0106	0.2759
Jordan	Amman Financial Market	0.0082	0.5350	0.1592	0.9657	-0.0414	-0.8559	-0.0480	-0.6230	0.0797	1.0795
Korea	Korea Stock Exchange	0.0037	0.9859	0.0028	1.7557	0.0012	0.8440	0.0184	1.0003	0.0360	1.6571
Korea	KOSDAQ	-0.0464	-1.5143	-0.0218	-0.6101	-0.0430	-1.3547	0.0452	0.7610	-0.1544	-2.0038
Malaysia	Kuala Lumpur Stock Exchange	0.0767	1.7945	0.0511	2.0140	0.0311	1.5112	0.0819	2.4646	0.0129	0.1675
Netherlands	Euronext Amsterdam	0.0033	0.5691	-0.0165	-1.5976	-0.0097	-1.9307	0.0951	0.8196	0.1009	1.6963
New Zealand	New Zealand Stock Exchange	-0.0005	-0.2484	-0.0086	-1.1505	-0.0011	-0.3158	0.0081	0.6727	-0.0129	-0.4410
Norway	Oslo Stock Exchange	0.0047	0.0842	0.0090	0.0798	0.0126	0.1183	0.0929	0.8513	-0.2525	-1.3430
Singapore	Stock Exchange of Singapore	0.0082	0.5255	-0.0061	-0.3073	0.0059	0.6243	0.2185	1.0259	0.0014	0.0437
South Africa	Johannesburg Stock Exchange	-0.0376	-1.2541	0.0301	1.1074	-0.0459	-0.8747	-1.3928	-0.9940	0.0217	0.5001
Spain	Barcelona Stock Exchange	0.0278	1.3935	-0.0232	-0.6778	0.0525	2.4028	0.0623	2.0171	0.0649	1.4941
Sweden	Stockholm Stock Exchange	-0.0299	-0.2219	0.1228	1.7316	-0.0224	-0.2913	-0.5901	-0.9142	-0.0406	-0.6837
Switzerland	CHE SWX Swiss Exchange	0.2326	1.1904	0.1504	2.3538	0.1335	1.1024	0.1049	2.1656	0.1681	3.1397
Taiwan	Taiwan Stock Exchange	0.0744	1.0086	0.1035	1.1631	-0.1159	-0.8356	0.0705	0.3231	0.0696	1.0165
Thailand	Stock Exchange of Thailand (SET)	0.2591	1.6696	0.0445	0.3916	0.1014	0.9533	0.4840	1.5170	0.0723	1.0865
United Kingdom	SETS (Electronic Trading Service)	0.0137	0.8123	0.0154	0.4842	0.0037	0.1353	0.1415	1.8939	0.0781	1.1889
United Kingdom	LSE-AIM	-0.0227	-1.5181	0.0144	0.9571	0.0358	2.1426	-0.0317	-1.0039	0.0201	0.4053
United States	New York Stock Exchange	0.1545	1.6450	0.0531	1.3041	0.1315	2.3044	0.1217	3.4266	0.1761	3.7783
United States	NASD OTC Bulletin Board	0.1945	1.0201	0.0105	1.0970	0.0073	0.5174	0.0099	0.7864	-0.1014	-0.8083
United States	American Stock Exchange	0.0116	0.9061	0.0336	1.7619	-0.0211	-0.8302	0.0136	0.8586	-0.0052	-0.1135
United States	Nasdaq	0.1756	2.3980	0.1994	2.6066	0.1157	0.6938	0.3578	1.1605	0.2185	1.7304

Table 20 Results for estimation of commonality in liquidity for individual stocks using Equation 4 for size quintiles: First difference of spread is regressed on value weighted average of first difference of spread for the market and value weighted market return.

Controlling for day-of-the-week effect

Table 21 reports the results for the estimation of (Equation 5) commonality in liquidity using first difference of spread, value weighted market variables and weekday dummy variables. as previously discussed, day-of-the-week effect that may exists for liquidity as well as return variables, may also affect commonality estimations. Our primary aim is to control for any such anomaly for our further tests for robustness purposes. Comparing the results to Table 19, we do not see any exchanges where including the daily dummies have noticeable impact on either level of commonality or on the mean concurrent coefficients. Thus, we will not be including daily dummy variables in our further analysis.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.0245	0.0045	0.0034	0.0325	2.4305	1.1681	0.7301	3.5254	55.91%	52.63%	51.14%	6.91%	4.87%	4.47%
Austria	Vienna Stock Exchange	0.0216	-0.0349	-0.0240	-0.0373	0.8029	-1.2496	-0.8228	-1.0241	56.67%	48.89%	48.89%	5.56%	4.44%	2.22%
Belgium	Euronext Brussels	0.0426	0.0458	-0.0300	0.0584	0.6924	0.8480	-0.9107	0.6496	65.97%	54.97%	49.21%	7.33%	1.57%	5.76%
Canada	TSX Venture Exchange	0.0072	-0.0043	0.0024	0.0053	0.8752	-0.8751	0.4660	0.3939	55.02%	52.02%	50.82%	5.50%	5.70%	5.65%
Canada	Toronto Stock Exchange	0.0149	-0.0044	-0.0004	0.0101	0.4512	-0.0936	-0.0146	0.1075	58.97%	52.62%	47.10%	9.29%	4.69%	2.58%
Chile	Santiago Stock Exchange	0.0216	0.1942	-0.3220	-0.1061	1.2668	0.9331	-1.0309	-0.9440	66.40%	45.60%	48.80%	12.00%	1.60%	1.60%
China	Shanghai Stock Exchange	0.1021	0.0222	-0.0483	0.0760	8.8744	1.9144	-3.4046	4.2589	69.59%	50.12%	41.95%	8.89%	6.49%	3.25%
China	Shenzhen Stock Exchange	0.1722	0.1059	-0.1032	0.1749	1.7860	1.3665	-1.6554	2.0851	67.53%	51.79%	46.10%	9.09%	5.52%	2.44%
Denmark	Copenhagen Stock Exchange	0.5117	0.3564	-0.0500	0.8182	1.8159	2.0691	-0.3600	2.3832	58.76%	54.24%	48.02%	6.78%	6.21%	4.52%
Egypt	Cairo Stock Exchange	0.0718	0.0064	0.0417	0.1199	2.3691	0.0951	1.2173	1.4450	65.32%	53.23%	49.19%	9.68%	8.06%	8.87%
Finland	Helsinki Stock Exchange	0.0171	0.0395	-0.0163	0.0403	0.6242	1.4921	-0.5935	0.7962	54.03%	54.84%	47.58%	2.42%	4.03%	4.84%
France	Euronext Paris	-0.0175	0.0044	-0.0330	-0.0461	-1.0975	0.4404	-1.6742	-1.5177	57.00%	50.13%	49.62%	2.80%	3.05%	3.05%
Germany	Berlin Stock Exchange	0.7767	-0.0532	0.8939	1.6174	1.0656	-0.8309	1.0012	0.9993	54.93%	50.92%	46.05%	4.77%	4.59%	4.07%
Germany	Stuttgart Stock Exchange	0.2162	-0.0258	0.0181	0.2085	3.3031	-0.6597	0.4962	2.0666	61.05%	48.26%	54.07%	4.65%	1.16%	4.07%
Germany	Munich Stock Exchange	0.2532	-0.0159	-0.3053	-0.0680	1.4596	-0.3120	-0.8964	-0.4521	58.91%	48.78%	49.02%	12.04%	8.45%	8.28%
Germany	Frankfurt Stock Exchange	-0.1259	-0.0083	0.0081	-0.1261	-1.4885	-0.3601	0.2103	-1.5390	48.84%	47.44%	52.56%	1.63%	3.26%	1.40%
Germany	Duesseldorf Stock Exchange	0.0207	0.0425	0.0050	0.0682	1.6374	1.8245	0.4099	1.9081	56.31%	54.52%	49.04%	11.97%	11.08%	9.55%
Greece	Athens Stock Exchange	0.0338	0.0075	0.0371	0.0784	1.2962	0.5504	1.8939	3.2322	64.16%	53.01%	53.61%	9.34%	5.12%	5.42%
Hong Kong	Hong Kong Stock Exchange	0.0015	-0.0045	0.0005	-0.0025	0.9009	-2.0374	0.3166	-1.0792	50.00%	49.57%	50.17%	1.28%	2.04%	2.55%
India	Bombay Stock Exchange	0.0588	-0.0194	-0.0236	0.0159	2.3092	-0.6241	-1.9600	0.9047	61.26%	49.60%	44.65%	9.82%	6.47%	3.99%
India	Indian National Exchange	0.1032	0.0354	-0.0270	0.1116	4.5836	1.7158	-1.4212	4.0040	70.03%	53.09%	46.58%	26.38%	10.42%	7.82%
Indonesia	Jakarta Stock Exchange	-0.3877	-0.2640	-0.1193	-0.7710	-1.1805	-0.7897	-0.6482	-1.1088	50.80%	53.05%	52.09%	4.82%	4.18%	4.82%
Italy	Milano Stock Exchange	0.0470	-0.0090	-0.0234	0.0146	3.0169	-0.7329	-1.8874	0.6552	51.60%	46.62%	46.26%	7.12%	2.14%	2.14%
Japan	Tokyo Stock Exchange	0.0325	0.0509	0.0769	0.1603	0.5053	1.0046	1.6308	1.8389	61.24%	52.49%	46.78%	6.32%	3.52%	2.73%
Japan	Osaka Stock Exchange	0.0614	-0.1197	-0.0236	-0.0819	2.4067	-1.4160	-1.0237	-0.9101	51.60%	50.86%	49.63%	1.47%	2.21%	3.19%
Japan	Japan Securities DAQS	0.0301	-0.0008	0.0025	0.0318	1.7856	-0.0687	0.1563	1.0367	55.43%	53.11%	51.21%	3.37%	2.85%	3.58%
Jordan	Amman Financial Market	0.0288	0.0006	0.0069	0.0363	0.9401	0.0679	0.4655	0.7599	50.63%	51.27%	56.33%	1.90%	4.43%	1.90%
Korea	Korea Stock Exchange	0.0013	-0.0015	0.0066	0.0064	0.4179	-0.3842	1.6754	0.8690	56.49%	51.49%	45.54%	9.46%	8.51%	5.95%
Korea	KOSDAQ	-0.0636	-0.0986	0.0520	-0.1102	-1.2475	-1.1031	0.8215	-1.3942	49.50%	47.69%	51.61%	3.92%	3.62%	3.72%
Malaysia	Kuala Lumpur Stock Exchange	0.0369	0.0065	0.0080	0.0513	3.9717	0.5972	0.9122	2.5730	58.46%	54.61%	49.15%	7.42%	6.30%	4.79%
Netherlands	Euronext Amsterdam	-0.0106	0.0178	0.0158	0.0231	-0.6426	1.0926	0.5537	0.8517	43.61%	53.38%	42.86%	3.76%	4.51%	2.26%
New Zealand	New Zealand Stock Exchange	-0.0019	-0.0011	-0.0003	-0.0033	-0.5643	-0.3568	-0.1311	-0.5570	52.28%	47.72%	51.78%	3.55%	2.54%	2.54%
Norway	Oslo Stock Exchange	-0.0167	0.0510	-0.0606	-0.0263	-0.5014	1.5991	-1.4530	-0.4916	56.79%	51.85%	51.03%	4.94%	4.12%	3.70%
Singapore	Stock Exchange of Singapore	0.0231	0.0089	0.0145	0.0465	0.7938	1.5099	1.1723	1.0903	49.54%	54.45%	52.61%	1.84%	3.07%	3.83%
South Africa	Johannesburg Stock Exchange	-0.1016	-0.1137	-0.0699	-0.2852	-0.9845	-1.0986	-1.0663	-1.0520	52.51%	45.38%	49.08%	3.17%	3.17%	2.11%
Spain	Barcelona Stock Exchange	0.0439	0.0121	-0.0163	0.0398	3.5713	1.2361	-1.5080	2.7938	60.47%	52.71%	58.91%	8.53%	9.30%	1.55%
Sweden	Stockholm Stock Exchange	0.0593	-0.0633	-0.0950	-0.0989	2.2758	-1.0387	-1.2076	-0.7526	53.12%	54.36%	49.63%	7.48%	8.73%	7.48%
Switzerland	CHE SWX Swiss Exchange	0.1804	0.0058	-0.0314	0.1548	3.2734	0.2641	-0.8987	2.9809	75.30%	49.10%	41.57%	25.90%	3.01%	3.92%
Taiwan	Taiwan Stock Exchange	0.0838	-0.0401	0.0141	0.0578	1.8382	-1.3140	0.6765	0.9168	59.70%	51.11%	50.07%	4.44%	3.70%	3.56%
Thailand	Stock Exchange of Thailand (SET)	0.0707	0.0727	0.0230	0.1664	1.9755	2.2759	0.8067	2.3594	51.14%	53.65%	54.11%	3.65%	3.65%	4.11%
United Kingdom	SETS (Electronic Trading Service)	0.0422	0.0169	-0.0112	0.0479	3.1999	1.5027	-1.4319	2.2008	56.17%	45.59%	49.12%	6.46%	6.23%	4.11%
United Kingdom	LSE-AIM	0.0088	0.0144	-0.0239	-0.0008	1.2549	1.6673	-1.4372	-0.0575	52.47%	50.99%	49.51%	4.69%	4.85%	3.29%
United States	New York Stock Exchange	0.1822	-0.0188	-0.0396	0.1238	9.7629	-1.3508	-2.4019	4.8914	73.68%	47.54%	39.33%	15.14%	4.19%	3.04%
United States	NASD OTC Bulletin Board	0.0130	0.0070	-0.0028	0.0172	0.6362	0.6316	-0.1410	0.4006	49.53%	49.20%	49.48%	4.12%	4.40%	4.45%
United States	American Stock Exchange	0.0482	-0.0042	-0.0354	0.0087	1.1857	-0.4284	-0.8448	0.6825	53.05%	51.47%	54.42%	6.29%	4.72%	7.07%
United States	Nasdaq	0.1771	0.0109	0.0362	0.2241	5.8776	0.2320	1.0567	2.8337	60.88%	48.42%	49.11%	8.86%	6.65%	6.83%

Table 21: Results for estimation of commonality in liquidity for individual stocks using Equation 5: First difference of spread is regressed on value weighted average of first difference of spread for the market, value weighted market return and four daily dummies.

Controlling for market direction

Table 22 reports the results for the estimation of (Equation 6) commonality in liquidity using first difference of spread, value weighted market variables and market direction dummy variable. In support of the previous discussion about the effect of market direction on liquidity and in line with our expectation that such effect may also affect the level of commonality, we find that the levels and coefficients are higher with the market trend dummy variable included in the estimation. However, for several countries, it either does not change or the impact is negligible. Thus, we will not be including market trend dummy variable in our further analysis.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.0233	0.0050	0.0026	0.0310	2.3114	1.3000	0.5667	3.3458	55.67%	52.88%	51.04%	7.06%	5.02%	4.52%
Austria	Vienna Stock Exchange	0.0232	-0.0248	-0.0337	-0.0352	0.8741	-0.6564	-1.0309	-0.9686	57.78%	48.89%	44.44%	5.56%	3.33%	3.33%
Belgium	Euronext Brussels	0.0422	0.0457	-0.0279	0.0600	0.7255	0.8793	-0.8524	0.7387	64.92%	53.40%	49.21%	7.33%	2.09%	5.76%
Canada	TSX Venture Exchange	0.0073	-0.0040	0.0048	0.0081	0.8938	-0.8707	1.0093	0.6945	55.17%	52.07%	51.62%	5.40%	5.15%	5.40%
Canada	Toronto Stock Exchange	0.0295	0.0118	0.0134	0.0548	1.1170	0.2908	0.5179	0.7098	59.34%	53.82%	48.48%	9.11%	4.78%	3.13%
Chile	Santiago Stock Exchange	0.0018	0.2695	-0.4210	-0.1498	0.0630	0.9393	-1.0173	-0.9759	64.80%	48.00%	48.80%	11.20%	2.40%	2.40%
China	Shanghai Stock Exchange	0.1044	0.0234	-0.0477	0.0801	9.3524	2.0083	-3.3475	4.5319	69.23%	50.84%	40.50%	8.77%	6.49%	3.25%
China	Shenzhen Stock Exchange	0.1520	0.0787	-0.0513	0.1794	1.6442	0.8611	-0.8727	2.5724	67.86%	51.30%	47.56%	8.77%	5.03%	2.92%
Denmark	Copenhagen Stock Exchange	0.5147	0.3238	-0.0313	0.8073	1.8033	2.1137	-0.2444	2.4001	58.76%	55.37%	47.46%	7.91%	6.21%	5.08%
Egypt	Cairo Stock Exchange	0.0628	-0.0290	0.0533	0.0871	2.6707	-0.5142	1.3704	1.5941	66.13%	53.23%	48.39%	12.10%	8.87%	8.87%
Finland	Helsinki Stock Exchange	0.0206	0.0443	-0.0131	0.0518	0.7397	1.6712	-0.5091	1.0331	57.26%	53.23%	46.77%	2.42%	4.03%	4.84%
France	Euronext Paris	-0.0154	0.0111	-0.0301	-0.0344	-0.9594	1.1649	-1.5358	-1.1573	57.25%	51.15%	48.98%	2.80%	2.54%	3.18%
Germany	Berlin Stock Exchange	0.6493	-0.0150	0.9625	1.5968	1.0235	-0.5736	0.9867	0.9939	55.03%	50.61%	46.05%	4.77%	4.84%	3.97%
Germany	Stuttgart Stock Exchange	0.5087	0.1713	0.0854	0.7654	1.3926	0.8118	1.1031	1.1888	61.05%	48.84%	56.98%	5.23%	0.58%	4.07%
Germany	Munich Stock Exchange	0.3049	-0.0251	-0.5113	-0.2316	1.7386	-0.5951	-0.9577	-0.6644	59.90%	49.13%	49.31%	12.09%	8.45%	8.39%
Germany	Frankfurt Stock Exchange	-0.1241	0.0015	0.0318	-0.0908	-1.2974	0.0833	1.1073	-1.0797	48.60%	46.28%	52.79%	1.63%	3.26%	2.09%
Germany	Duesseldorf Stock Exchange	0.0257	0.0389	0.0021	0.0667	1.7824	1.6828	0.1640	1.8257	56.69%	54.52%	49.04%	11.85%	11.08%	9.30%
Greece	Athens Stock Exchange	0.0352	0.0093	0.0375	0.0820	1.3663	0.6944	1.9194	3.3566	64.46%	54.82%	53.61%	9.04%	6.33%	5.72%
Hong Kong	Hong Kong Stock Exchange	0.0015	-0.0041	0.0001	-0.0024	0.9354	-1.9347	0.0952	-1.1658	50.43%	49.57%	50.17%	1.53%	2.38%	2.64%
India	Bombay Stock Exchange	0.0619	-0.0224	-0.0162	0.0233	2.5574	-0.7089	-1.2436	1.2060	60.86%	50.80%	44.89%	9.74%	6.55%	4.63%
India	Indian National Exchange	0.1238	0.0162	-0.0347	0.1052	6.2024	1.0656	-1.7547	4.2701	73.29%	51.79%	43.97%	27.36%	9.77%	8.79%
Indonesia	Jakarta Stock Exchange	-0.3925	-0.2410	-0.1136	-0.7471	-1.1745	-0.7300	-0.6068	-1.0621	50.48%	52.09%	53.70%	5.14%	3.86%	5.14%
Italy	Milano Stock Exchange	0.0434	-0.0089	-0.0273	0.0072	2.6799	-0.7799	-2.1203	0.3243	53.38%	47.69%	45.20%	7.12%	2.85%	2.14%
Japan	Tokyo Stock Exchange	0.0253	0.0554	0.0872	0.1679	0.3783	0.8767	1.7195	1.5830	60.51%	52.92%	47.08%	6.08%	3.34%	2.43%
Japan	Osaka Stock Exchange	0.0962	0.2264	-0.0241	0.2986	1.9407	0.9292	-1.0143	1.1121	51.11%	50.86%	50.12%	1.47%	1.97%	3.44%
Japan	Japan Securities DAQS	0.0283	-0.0049	0.0052	0.0287	1.8366	-0.4408	0.3106	1.0526	55.22%	52.69%	51.21%	3.48%	2.53%	3.06%
Jordan	Amman Financial Market	0.0349	-0.0138	0.0144	0.0356	1.2203	-0.7560	0.8305	0.9232	48.73%	53.16%	55.70%	1.90%	4.43%	1.90%
Korea	Korea Stock Exchange	0.0056	0.0017	0.0067	0.0140	2.6602	0.5604	1.5817	2.3275	56.89%	50.68%	45.41%	9.32%	7.97%	5.81%
Korea	KOSDAQ	-0.0230	0.0023	-0.0200	-0.0407	-1.6671	0.1257	-1.3854	-1.8883	49.80%	48.49%	51.71%	3.72%	3.72%	3.82%
Malaysia	Kuala Lumpur Stock Exchange	0.0374	0.0033	0.0095	0.0503	3.9990	0.3150	1.0939	2.5324	58.55%	54.14%	49.81%	7.24%	6.30%	4.79%
Netherlands	Euronext Amsterdam	-0.0088	0.0145	0.0228	0.0286	-0.5177	0.9314	0.8808	1.0975	42.86%	51.88%	41.35%	3.76%	4.51%	2.26%
New Zealand	New Zealand Stock Exchange	-0.0024	-0.0007	-0.0002	-0.0033	-0.6391	-0.2006	-0.1040	-0.5122	51.27%	47.72%	50.25%	3.55%	2.54%	2.54%
Norway	Oslo Stock Exchange	-0.0141	0.0538	-0.0597	-0.0200	-0.4086	1.7052	-1.4507	-0.3679	58.02%	51.85%	51.03%	5.35%	4.53%	4.53%
Singapore	Stock Exchange of Singapore	0.0313	0.0128	0.0189	0.0630	0.8450	1.3597	1.1777	1.0483	49.85%	54.45%	52.15%	1.69%	3.53%	4.29%
South Africa	Johannesburg Stock Exchange	-0.1041	-0.1287	-0.0646	-0.2974	-0.9073	-1.0866	-1.0886	-1.0206	53.83%	47.49%	50.92%	3.17%	3.69%	1.85%
Spain	Barcelona Stock Exchange	0.0452	0.0102	-0.0183	0.0371	3.4798	1.0956	-1.5756	2.6117	58.14%	54.26%	58.91%	8.53%	9.30%	1.55%
Sweden	Stockholm Stock Exchange	0.0561	-0.0672	-0.0999	-0.1110	2.2607	-1.0375	-1.2982	-0.8288	53.37%	54.61%	49.38%	7.23%	7.98%	7.73%
Switzerland	CHE SWX Swiss Exchange	0.1805	0.0031	-0.0263	0.1572	3.2416	0.1581	-0.7792	3.1681	76.20%	49.10%	42.47%	25.60%	3.31%	3.92%
Taiwan	Taiwan Stock Exchange	0.0843	-0.0503	0.0107	0.0447	1.9934	-1.3784	0.5675	0.7713	58.81%	51.11%	50.81%	4.59%	3.70%	3.70%
Thailand	Stock Exchange of Thailand (SET)	0.0835	0.0669	0.0356	0.1859	2.0733	2.1303	1.2593	2.3966	52.28%	52.97%	56.85%	4.11%	3.42%	3.20%
United Kingdom	SETS (Electronic Trading Service)	0.0399	0.0138	-0.0072	0.0466	3.0679	1.2344	-0.8851	2.1681	56.17%	46.89%	49.71%	6.70%	6.11%	3.76%
United Kingdom	LSE-AIM	0.0067	0.0133	-0.0183	0.0017	1.0339	1.4718	-1.3973	0.1287	53.29%	50.99%	50.58%	4.52%	4.85%	3.37%
United States	New York Stock Exchange	0.1758	-0.0178	-0.0432	0.1147	8.7400	-1.4896	-2.5982	3.9277	73.86%	47.66%	39.76%	14.95%	4.13%	3.10%
United States	NASD OTC Bulletin Board	0.0216	0.0110	-0.0096	0.0230	0.8167	0.7645	-0.5389	0.4704	49.39%	49.72%	49.86%	4.31%	4.64%	4.55%
United States	American Stock Exchange	0.0450	-0.0025	-0.0333	0.0092	1.0911	-0.3353	-0.8760	0.9458	50.88%	50.69%	54.22%	6.29%	4.72%	7.07%
United States	Nasdaq	0.1685	0.0057	0.0382	0.2123	6.1540	0.1229	1.0385	2.7150	61.21%	47.84%	48.60%	9.15%	6.54%	6.68%

Table 22: Results for estimation of commonality in liquidity for individual stocks using Equation 6: First difference of spread is regressed on value weighted average of first difference of spread for the market, value weighted market return and market direction dummy.

Controlling for autoregressive component

Table 23 reports the results for the estimation of (Equation 7) commonality in liquidity using first difference of spread, value weighted market variables and lag of first difference of spread. Based on our preliminary tests (autocorrelation, normality etc.), we believe that there may be a need to include a lag value of the individual stock's change in liquidity. We note that the impact of including the lagged variable is negligible.

In terms of market direction and autoregressive components, we believe that their inclusion may have some effect in some stocks. However, their impact is not strong enough to divert us from our aim for comparable results to previous literature.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.0275	0.0186	0.0065	0.0526	2.8966	4.8051	1.3528	5.0028	56.96%	56.16%	51.99%	7.80%	7.46%	5.12%
Austria	Vienna Stock Exchange	0.0255	-0.0268	-0.0289	-0.0303	1.1498	-0.9432	-1.0408	-0.8779	58.89%	47.78%	46.67%	5.56%	6.67%	2.22%
Belgium	Euronext Brussels	0.0774	0.0712	-0.0257	0.1229	1.0325	1.3550	-0.8480	1.1723	65.45%	60.21%	51.83%	8.90%	1.57%	4.71%
Canada	TSX Venture Exchange	0.0082	0.0008	0.0075	0.0165	1.0528	0.1787	1.7070	1.3065	55.42%	53.77%	53.07%	6.60%	6.75%	7.15%
Canada	Toronto Stock Exchange	0.0567	0.0491	0.0272	0.1330	2.9465	1.6465	1.1099	2.2874	61.36%	62.74%	51.61%	11.32%	6.81%	4.51%
Chile	Santiago Stock Exchange	0.0191	0.2695	-0.3976	-0.1089	1.0402	0.9728	-1.0155	-0.8672	63.20%	52.80%	50.40%	12.80%	4.00%	1.60%
China	Shanghai Stock Exchange	0.1225	0.1006	-0.0245	0.1986	11.0814	8.3975	-1.9910	10.0464	72.96%	65.38%	41.83%	11.90%	11.06%	4.33%
China	Shenzhen Stock Exchange	0.2069	0.2071	-0.0128	0.4012	2.1648	2.3366	-0.2035	4.2994	73.38%	65.75%	50.00%	12.50%	9.25%	4.06%
Denmark	Copenhagen Stock Exchange	0.5916	0.3871	0.0469	1.0256	1.9982	2.3426	0.2835	2.7475	59.32%	57.06%	53.11%	10.73%	9.04%	6.21%
Egypt	Cairo Stock Exchange	0.0674	0.0200	0.0158	0.1032	3.2542	0.3265	0.6185	1.5035	75.00%	56.45%	52.42%	11.29%	14.52%	8.06%
Finland	Helsinki Stock Exchange	0.0158	0.0529	-0.0139	0.0548	0.6172	2.0663	-0.6444	1.0829	59.68%	58.06%	51.61%	5.65%	4.03%	4.03%
France	Euronext Paris	-0.0174	0.0112	-0.0313	-0.0375	-1.0324	1.1588	-1.6851	-1.1844	55.85%	57.25%	50.25%	3.44%	2.42%	3.18%
Germany	Berlin Stock Exchange	0.7516	-0.0103	0.9619	1.7031	1.0568	-0.3276	0.9910	1.0144	54.75%	53.53%	47.02%	5.53%	4.84%	4.14%
Germany	Stuttgart Stock Exchange	0.1577	0.0069	0.0058	0.1704	3.6172	0.2462	0.1677	2.5944	59.30%	52.33%	54.07%	4.07%	2.91%	4.07%
Germany	Munich Stock Exchange	0.2578	-0.0125	-0.4650	-0.2196	1.5361	-0.3095	-0.9434	-0.7005	59.32%	55.61%	50.41%	13.14%	11.46%	7.81%
Germany	Frankfurt Stock Exchange	-0.1171	-0.0453	0.0442	-0.1182	-1.3704	-1.1766	1.1470	-1.2650	50.23%	47.44%	56.05%	1.63%	2.56%	1.40%
Germany	Duesseldorf Stock Exchange	0.0197	0.0452	-0.0067	0.0581	1.8531	2.1717	-0.6143	2.0058	55.67%	59.75%	49.68%	12.74%	13.12%	8.28%
Greece	Athens Stock Exchange	0.0810	0.0702	0.0648	0.2160	4.0284	6.2419	2.7984	7.4688	73.80%	72.29%	60.24%	16.27%	12.95%	10.24%
Hong Kong	Hong Kong Stock Exchange	0.0016	-0.0029	0.0009	-0.0004	1.2551	-1.6186	0.7963	-0.2107	51.36%	50.26%	50.43%	2.47%	2.21%	2.55%
India	Bombay Stock Exchange	0.1004	0.0399	-0.0056	0.1347	5.0139	1.5685	-0.4509	6.1774	66.29%	60.70%	49.04%	14.46%	10.70%	5.51%
India	Indian National Exchange	0.1396	0.0954	-0.0225	0.2125	7.2980	5.3577	-1.2415	6.8417	73.94%	67.43%	43.32%	34.20%	22.48%	8.79%
Indonesia	Jakarta Stock Exchange	-0.2805	-0.2146	-0.0198	-0.5149	-0.9315	-0.6314	-0.1055	-0.7608	55.95%	54.66%	52.41%	6.11%	5.14%	5.14%
Italy	Milano Stock Exchange	0.0447	0.0111	-0.0286	0.0272	3.2176	0.8470	-2.2863	1.4868	49.11%	53.74%	42.70%	5.34%	1.42%	1.42%
Japan	Tokyo Stock Exchange	0.0351	0.0610	0.0782	0.1743	0.5253	1.1364	1.7899	1.8000	65.07%	61.73%	49.33%	8.38%	7.41%	2.86%
Japan	Osaka Stock Exchange	0.0184	-0.4558	-0.0086	-0.4461	0.5468	-1.1243	-0.5702	-1.0366	52.33%	49.39%	51.60%	2.21%	1.97%	3.44%
Japan	Japan Securities DAQS	0.0394	0.0150	0.0190	0.0734	2.1464	1.4640	1.2509	2.2877	57.32%	55.53%	52.79%	4.74%	2.74%	3.69%
Jordan	Amman Financial Market	0.0239	-0.0137	0.0101	0.0203	0.8677	-0.7157	0.4823	0.5387	48.10%	53.80%	53.80%	1.27%	3.80%	1.90%
Korea	Korea Stock Exchange	0.0076	0.0030	0.0050	0.0156	3.0160	1.0805	1.3898	2.6248	58.92%	56.89%	49.05%	10.54%	9.46%	6.62%
Korea	KOSDAQ	-0.0067	0.0057	-0.0218	-0.0228	-0.5259	0.3718	-1.3407	-0.8599	53.52%	53.02%	54.43%	5.23%	4.63%	4.73%
Malaysia	Kuala Lumpur Stock Exchange	0.0537	0.0252	0.0181	0.0971	5.8087	2.6456	2.0903	4.6736	62.31%	59.87%	52.16%	9.21%	8.46%	5.17%
Netherlands	Euronext Amsterdam	0.0045	0.0117	0.0255	0.0417	0.3029	1.2472	1.0878	1.4032	45.86%	52.63%	42.86%	3.76%	3.76%	2.26%
New Zealand	New Zealand Stock Exchange	-0.0020	0.0005	0.0005	-0.0009	-0.5283	0.1632	0.2576	-0.1352	52.28%	48.22%	51.78%	3.55%	4.06%	3.05%
Norway	Oslo Stock Exchange	-0.0085	0.0433	-0.0563	-0.0215	-0.2665	1.9044	-1.5616	-0.3658	57.20%	55.14%	48.97%	5.76%	5.76%	3.70%
Singapore	Stock Exchange of Singapore	0.0204	0.0077	0.0059	0.0340	0.9753	1.6893	1.0615	1.6315	51.99%	55.67%	53.83%	2.30%	4.91%	4.14%
South Africa	Johannesburg Stock Exchange	-0.0929	-0.1033	-0.0569	-0.2532	-0.8344	-0.9769	-1.0202	-0.9318	56.99%	54.62%	51.45%	5.01%	5.54%	2.37%
Spain	Barcelona Stock Exchange	0.0517	0.0181	-0.0123	0.0575	3.9353	2.7066	-1.0437	3.1770	66.67%	61.24%	57.36%	8.53%	10.85%	3.10%
Sweden	Stockholm Stock Exchange	0.0085	-0.0355	-0.0977	-0.1247	0.1661	-0.7614	-1.3016	-0.7602	57.36%	60.35%	52.37%	9.23%	10.47%	7.98%
Switzerland	CHE SWX Swiss Exchange	0.1801	0.0743	-0.0170	0.2373	3.8639	4.1304	-0.5196	4.6727	75.30%	64.76%	43.98%	28.61%	15.36%	5.12%
Taiwan	Taiwan Stock Exchange	0.0988	0.0031	0.0380	0.1399	2.5983	0.1381	1.6831	2.2854	62.52%	58.81%	53.93%	7.70%	6.81%	4.44%
Thailand	Stock Exchange of Thailand (SET)	0.0840	0.0939	0.0344	0.2124	2.3782	2.6911	1.3173	2.8388	54.79%	58.22%	57.76%	5.02%	4.57%	3.42%
United Kingdom	SETS (Electronic Trading Service)	0.0403	0.0247	-0.0071	0.0580	3.2827	2.2373	-1.0340	2.6333	55.35%	49.00%	50.18%	7.52%	6.58%	4.58%
United Kingdom	LSE-AIM	0.0021	0.0168	-0.0145	0.0044	0.2772	1.7528	-1.2766	0.3053	52.80%	52.06%	51.15%	5.18%	4.77%	3.45%
United States	New York Stock Exchange	0.1989	0.0846	-0.0316	0.2520	10.5701	7.0355	-2.4470	8.7678	77.20%	66.93%	41.09%	20.49%	10.46%	3.83%
United States	NASD OTC Bulletin Board	0.0192	0.0086	-0.0052	0.0226	0.8220	0.6262	-0.3098	0.4884	49.30%	50.28%	50.52%	4.97%	4.55%	4.97%
United States	American Stock Exchange	0.0413	0.0141	0.0043	0.0597	1.1651	1.5897	1.0912	1.3738	50.69%	54.42%	54.42%	5.70%	5.30%	8.25%
United States	Nasdaq	0.1979	0.0803	0.0460	0.3242	6.7029	1.9155	1.6397	4.5768	64.73%	57.94%	51.87%	11.41%	10.97%	8.75%

Table 23: Results for estimation of commonality in liquidity for individual stocks using Equation 7: First difference of spread is regressed on value weighted average of first difference of spread for the market, value weighted market return and lag of first difference of spread.

Other liquidity measures

Similar to previous studies, we also estimate the commonality models using different measures of liquidity for robustness purposes. To this point, the two differences of our methodology and previous literature are the use of first difference instead of percentage change and use of value weighted market variables instead of equal weighted. So far, both of these differences seem to make significant impact on the overall commonality results and possible conclusions. Please note, however, that the percentages of commonality may differ between studies due to use of different time periods (etc.) but most importantly due to differences in sample sizes.

We need to emphasize that most of the previous studies use intraday transaction data to have end-of-day average bid and ask prices for more reliable daily liquidity measures. However, such data has its shortfalls as we also evaluated using intraday data through the same Reuters database. One of the major drawbacks is apparent for exchanges where intraday activity is not frequent. For such markets (in fact for most of the markets), infrequent transactions may have one sided bid-ask quotations. This means that the market order given to the market may have a direction and would have only bid or ask price. Thus, having the other side of the order as zero. Another problem is the availability of continuous intraday data. When we compared the sample size (in terms of observations and number of stocks) with continuous trading data, between end-of-day data and intraday data, it is apparent that the variables needed for liquidity calculations may limit the size of the overall sample for intraday frequency. We believe, this is the main reason some of the previous literature that studies international markets have such small sample sizes (both in terms of number of number of trading days and number of stocks). Considering that we are reporting percentage levels, such small samples, to us, should

be considered as a bias with magnifying effect. The last, but not the least, point about international intraday data is the fact that data vendors and data provider may opt to keep companies with higher prices, bigger size and perhaps lower risk due to the size of the intraday data.

Proportional spread

Table 24 reports the results for the estimation of (Equation 8) commonality in liquidity using first difference of proportional spread and value weighted market variables. While the effect of using proportional spread is higher levels of commonality, we observe that the increase is higher for concurrent commonality coefficients. Thus, we note that, while both measures are considered to be reliable proxies for liquidity, their results may be different in terms of commonality. We also note that such difference does not render one measure more (or less) reliable than other. However, we will compare our results with proportional spread measure as well for a robustness check. We will report results only when there is significant difference between using one measure over another.

Effective spread

Table 25 reports the results for the estimation of (Equation 9) commonality in liquidity using first difference of effective spread and value weighted market variables. The change observed with using effective spread is the opposite of using proportional spreads. The level of change is not as high as it was for proportional spread, but we will also check our results for effective spreads.

Proportional effective spread

Table 26 reports the results for the estimation of (Equation 10) commonality in liquidity using first difference of proportional effective spread and value weighted market variables.

The impact of proportional effective spread is negligible. Thus, unlike the two previous alternative liquidity measures, we will not be considering the proportional effective spread for our future analysis.

Percentage spread

Table 27 reports the results for the estimation of (Equation 11) commonality in liquidity using first difference of percentage spread and value weighted market variables. The effect of percentage spread and proportional spread is almost identical. Thus, we will only be using proportional and effective spreads as robustness checks for our further analysis.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.3811	0.0194	-0.0348	0.3658	4.5035	0.2494	-0.3544	2.4212	60.54%	50.25%	48.51%	6.21%	3.58%	3.13%
Austria	Vienna Stock Exchange	0.0278	-0.0073	-0.0088	0.0118	0.7341	-0.2795	-0.5194	0.1858	57.78%	50.00%	50.00%	7.78%	6.67%	2.22%
Belgium	Euronext Brussels	0.1037	0.0382	0.0277	0.1696	3.5902	1.6336	1.2083	3.0125	65.45%	52.36%	44.50%	9.42%	2.62%	4.71%
Canada	TSX Venture Exchange	0.2885	0.0132	0.1502	0.4519	6.2205	0.2794	3.2172	5.2147	59.57%	50.87%	54.42%	6.25%	3.95%	4.10%
Canada	Toronto Stock Exchange	0.4223	0.1745	-0.0209	0.5759	3.8829	1.5697	-0.2032	2.8603	62.28%	53.63%	49.49%	10.67%	4.32%	3.77%
Chile	Santiago Stock Exchange	0.1316	-0.1079	-0.0572	-0.0336	2.7070	-2.4729	-2.2715	-0.4028	73.60%	43.20%	36.80%	22.40%	0.00%	3.20%
China	Shanghai Stock Exchange	0.4681	0.0234	-0.0447	0.4468	21.6177	1.2143	-2.0233	14.9951	81.01%	52.04%	47.24%	15.87%	4.33%	3.13%
China	Shenzhen Stock Exchange	0.4384	0.0729	-0.0507	0.4607	6.4996	1.3841	-0.9271	6.1122	75.00%	51.79%	46.59%	16.40%	6.49%	3.08%
Denmark	Copenhagen Stock Exchange	0.0980	0.0945	-0.0529	0.1396	0.9712	0.8676	-0.4819	0.6469	57.06%	56.50%	53.11%	7.34%	6.21%	5.65%
Egypt	Cairo Stock Exchange	0.2375	-0.0250	-0.1815	0.0311	3.3454	-0.2674	-1.4051	0.1348	58.06%	42.74%	46.77%	13.71%	2.42%	4.03%
Finland	Helsinki Stock Exchange	0.0191	0.0246	0.0257	0.0694	2.0174	1.1330	0.6366	1.0165	60.48%	54.03%	45.16%	0.81%	0.81%	0.00%
France	Euronext Paris	0.0196	0.0192	-0.0061	0.0328	0.9534	1.2714	-0.3216	0.9891	57.12%	53.05%	52.54%	2.29%	1.78%	2.42%
Germany	Berlin Stock Exchange	0.3096	-0.0746	0.1417	0.3766	1.8997	-0.6752	0.9058	1.3254	62.34%	52.56%	53.15%	9.95%	5.71%	5.53%
Germany	Stuttgart Stock Exchange	0.5048	0.1220	0.0117	0.6385	2.3579	0.6832	0.0958	1.8769	57.56%	45.35%	57.56%	3.49%	3.49%	4.07%
Germany	Munich Stock Exchange	0.8248	0.0166	0.0636	0.9050	13.1266	0.3907	0.6114	6.7093	71.53%	50.23%	53.70%	21.82%	2.95%	6.83%
Germany	Frankfurt Stock Exchange	0.3696	0.0289	0.1875	0.5860	2.0083	0.1951	1.2267	1.4817	55.58%	46.28%	51.86%	2.79%	3.26%	3.02%
Germany	Duesseldorf Stock Exchange	0.7283	0.1838	0.1395	1.0516	11.5978	2.6575	2.0574	9.9649	70.32%	55.03%	52.99%	20.76%	9.94%	7.01%
Greece	Athens Stock Exchange	0.2245	0.0238	0.1195	0.3679	6.3101	0.7428	3.2251	6.4113	68.67%	53.01%	54.22%	10.54%	3.61%	3.61%
Hong Kong	Hong Kong Stock Exchange	0.0591	0.0599	0.0565	0.1756	0.9326	1.1654	0.9798	1.4412	51.96%	51.45%	52.55%	3.23%	3.40%	3.66%
India	Bombay Stock Exchange	0.5213	0.1071	-0.0959	0.5325	7.2817	1.6629	-1.5926	4.3784	67.33%	55.51%	43.21%	12.86%	6.15%	2.56%
India	Indian National Exchange	0.4568	-0.0459	-0.0400	0.3708	6.8945	-1.3321	-1.0348	3.6817	82.74%	42.35%	40.39%	40.07%	5.21%	4.56%
Indonesia	Jakarta Stock Exchange	0.8148	-0.0984	0.0533	0.7698	1.6176	-0.4115	0.3201	1.0689	61.74%	50.48%	51.77%	7.07%	2.57%	4.18%
Italy	Milano Stock Exchange	0.0142	0.0278	0.0067	0.0487	0.5575	0.7028	0.2065	0.7099	51.25%	49.82%	48.40%	5.34%	3.91%	2.14%
Japan	Tokyo Stock Exchange	0.0242	0.0167	0.0086	0.0494	1.8315	1.2229	0.7112	1.7997	54.50%	46.60%	49.09%	3.10%	2.67%	3.40%
Japan	Osaka Stock Exchange	0.2128	-0.1285	-0.0741	0.0102	1.7067	-0.5472	-0.6336	0.0336	52.83%	50.86%	48.89%	3.19%	2.95%	1.47%
Japan	Japan Securities DAQS	0.1061	0.0179	0.0015	0.1255	3.2956	0.5837	0.0459	2.3114	59.22%	52.69%	49.63%	5.37%	4.53%	3.79%
Jordan	Amman Financial Market	0.0307	-0.0267	0.0513	0.0552	0.9359	-0.8716	1.7313	0.9695	51.27%	50.00%	56.33%	5.06%	3.16%	1.90%
Korea	Korea Stock Exchange	0.0936	0.0124	-0.0878	0.0182	4.4092	0.7273	-5.5265	0.6904	64.73%	50.41%	36.76%	12.84%	3.78%	2.16%
Korea	KOSDAQ	0.0173	-0.0580	-0.0198	-0.0604	0.2291	-0.8431	-0.2700	-0.5124	58.05%	47.59%	49.40%	4.12%	2.72%	2.62%
Malaysia	Kuala Lumpur Stock Exchange	0.5909	0.1284	0.0853	0.8045	10.5878	2.5492	1.6509	8.9025	66.64%	54.51%	51.88%	11.47%	5.92%	4.14%
Netherlands	Euronext Amsterdam	0.0070	0.0001	-0.0137	-0.0066	0.6408	0.0152	-1.3262	-0.3769	45.11%	49.62%	41.35%	5.26%	3.76%	1.50%
New Zealand	New Zealand Stock Exchange	0.0111	-0.0227	-0.0118	-0.0234	0.4416	-0.8879	-0.4941	-0.3969	54.82%	43.65%	52.28%	4.57%	3.55%	4.06%
Norway	Oslo Stock Exchange	-0.0693	0.0597	-0.3634	-0.3731	-0.2759	0.3056	-1.5845	-0.8363	58.02%	54.73%	50.62%	7.41%	7.41%	4.12%
Singapore	Stock Exchange of Singapore	0.2716	0.3242	0.1848	0.7806	2.6887	3.9133	1.8255	4.4203	56.29%	60.12%	57.06%	5.37%	4.60%	5.52%
South Africa	Johannesburg Stock Exchange	-0.1633	0.1151	-0.1761	-0.2243	-0.6535	0.5833	-0.7625	-0.5327	55.15%	52.24%	46.97%	5.54%	3.69%	3.43%
Spain	Barcelona Stock Exchange	0.0484	-0.0029	0.0086	0.0541	2.7524	-0.1693	0.5653	2.3356	59.69%	48.06%	58.14%	6.20%	5.43%	1.55%
Sweden	Stockholm Stock Exchange	-0.1477	0.2802	0.1952	0.3277	-0.5934	1.5222	0.7213	0.7475	60.10%	52.12%	54.11%	9.23%	8.48%	7.98%
Switzerland	CHE SWX Swiss Exchange	0.1667	-0.0058	-0.0416	0.1193	8.7530	-0.5585	-3.6575	5.6110	72.59%	47.89%	44.88%	24.70%	4.52%	4.22%
Taiwan	Taiwan Stock Exchange	0.2626	-0.0335	-0.0961	0.1331	4.3334	-0.5937	-1.7993	1.3387	66.96%	49.78%	48.44%	8.30%	3.70%	2.07%
Thailand	Stock Exchange of Thailand (SET)	0.1033	0.0744	0.0413	0.2190	1.3562	0.9688	0.5251	1.3936	56.16%	54.79%	48.86%	6.85%	5.25%	5.94%
United Kingdom	SETS (Electronic Trading Service)	0.0837	-0.0047	-0.0086	0.0704	6.1422	-0.3240	-0.6846	2.9197	59.58%	46.89%	51.00%	6.11%	2.70%	1.41%
United Kingdom	LSE-AIM	0.0316	0.0706	0.0042	0.1065	1.4883	3.3508	0.1747	2.4552	53.13%	52.22%	49.10%	3.45%	3.21%	2.30%
United States	New York Stock Exchange	0.6790	0.0166	-0.0684	0.6272	14.3096	0.3927	-1.7112	7.6790	78.66%	50.70%	42.98%	24.50%	3.59%	2.49%
United States	NASD OTC Bulletin Board	-0.0130	-0.0376	-0.0134	-0.0640	-0.3252	-1.2238	-0.5465	-1.1523	50.66%	50.94%	49.63%	2.53%	2.95%	2.53%
United States	American Stock Exchange	0.1003	0.0240	0.0580	0.1823	2.5996	0.4860	1.5100	2.6006	52.65%	51.08%	53.44%	5.30%	6.29%	6.29%
United States	Nasdaq	0.5602	-0.0051	0.0136	0.5687	11.2750	-0.1225	0.3997	7.2311	70.94%	48.35%	50.67%	5.38%	1.45%	1.96%

Table 24: Results for estimation of commonality in liquidity for individual stocks using Equation 8: First difference of proportional spread is regressed on value weighted average of first difference of proportional spread for the market and value weighted market return.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.0165	-0.0014	0.0006	0.0157	1.7979	-0.2167	0.1370	1.0584	51.09%	49.40%	47.96%	4.82%	5.47%	4.82%
Austria	Vienna Stock Exchange	0.0123	-0.0156	-0.0256	-0.0289	0.8023	-0.9944	-1.4768	-0.7396	64.44%	48.89%	37.78%	5.56%	3.33%	3.33%
Belgium	Euronext Brussels	0.2651	0.0790	0.1385	0.4826	1.4051	1.0272	1.6020	1.4214	57.59%	52.36%	57.07%	3.66%	3.66%	5.24%
Canada	TSX Venture Exchange	0.0158	0.0013	-0.0002	0.0170	1.8690	0.2273	-0.0257	1.7970	53.07%	52.27%	51.62%	6.30%	5.90%	5.25%
Canada	Toronto Stock Exchange	0.0126	0.0130	-0.0147	0.0108	0.3644	0.6552	-0.5712	0.1715	57.77%	53.08%	50.14%	8.28%	4.51%	5.34%
Chile	Santiago Stock Exchange	-0.9551	-0.3683	-0.5048	-1.8282	-0.9690	-0.8964	-0.9818	-0.9571	64.00%	47.20%	57.60%	7.20%	4.80%	4.00%
China	Shanghai Stock Exchange	0.3424	-0.0034	0.0070	0.3461	16.6099	-0.3208	0.5295	11.7787	84.62%	46.39%	48.32%	46.51%	8.89%	7.81%
China	Shenzhen Stock Exchange	0.3521	0.0955	-0.0317	0.4159	4.4057	1.2127	-0.5114	4.6364	73.54%	47.73%	55.36%	20.94%	4.71%	7.31%
Denmark	Copenhagen Stock Exchange	0.1341	-0.1208	-0.1681	-0.1548	1.0620	-0.6513	-0.6452	-0.2928	63.28%	40.11%	58.76%	11.30%	4.52%	3.95%
Egypt	Cairo Stock Exchange	0.0421	-0.0652	0.0228	-0.0003	1.1322	-0.9457	0.7724	-0.0047	62.90%	50.00%	54.03%	16.94%	6.45%	7.26%
Finland	Helsinki Stock Exchange	0.0035	-0.0123	0.0111	0.0023	0.2661	-1.0397	1.2918	0.1218	52.42%	37.10%	49.19%	10.48%	4.03%	5.65%
France	Euronext Paris	0.0101	0.0182	-0.0015	0.0268	0.7385	1.9072	-0.1214	1.1423	52.93%	52.42%	50.76%	4.33%	3.69%	3.44%
Germany	Berlin Stock Exchange	0.0669	0.0586	-0.0119	0.1136	3.4823	1.1884	-0.9053	2.2145	67.39%	42.67%	46.78%	14.17%	4.00%	3.97%
Germany	Stuttgart Stock Exchange	-0.0003	0.0805	0.1080	0.1882	-0.0055	2.4302	1.5721	2.7376	51.16%	52.33%	52.91%	3.49%	4.65%	5.81%
Germany	Munich Stock Exchange	0.1345	0.0186	-0.0347	0.1185	5.4026	0.5796	-0.9652	2.1062	64.99%	53.70%	50.17%	19.56%	11.92%	11.00%
Germany	Frankfurt Stock Exchange	0.0375	-0.0001	-0.0006	0.0369	1.1304	-0.0034	-0.0340	0.6884	53.02%	48.60%	50.93%	1.63%	0.93%	3.02%
Germany	Duesseldorf Stock Exchange	0.0326	-0.0077	0.0027	0.0276	4.5301	-1.1383	0.5025	2.2263	60.51%	53.38%	50.70%	10.06%	5.35%	5.99%
Greece	Athens Stock Exchange	0.0624	0.0044	0.0032	0.0700	5.7553	0.4056	0.2823	3.2022	67.17%	49.70%	48.80%	18.37%	11.75%	10.84%
Hong Kong	Hong Kong Stock Exchange	-0.0004	-0.0030	-0.0029	-0.0063	-0.2306	-1.2935	-1.6086	-1.2997	52.55%	49.40%	47.96%	2.64%	2.47%	4.08%
India	Bombay Stock Exchange	0.0773	0.0089	-0.0153	0.0710	5.7720	0.5124	-1.0495	2.4302	67.41%	55.35%	52.32%	17.65%	9.74%	8.47%
India	Indian National Exchange	0.0906	0.0018	-0.0043	0.0881	3.7699	0.1087	-0.1906	1.9726	71.99%	41.69%	43.32%	21.82%	6.19%	6.51%
Indonesia	Jakarta Stock Exchange	-0.0520	0.1250	0.0575	0.1304	-0.7651	1.0324	0.6993	0.6604	45.66%	48.55%	56.27%	1.29%	2.89%	3.54%
Italy	Milano Stock Exchange	0.0439	-0.0052	-0.0265	0.0123	2.6826	-0.3592	-1.6748	0.4021	53.74%	46.98%	47.69%	3.20%	1.78%	3.56%
Japan	Tokyo Stock Exchange	-0.0074	0.1014	0.0499	0.1439	-0.1411	2.1274	1.0519	1.6143	56.38%	52.49%	50.00%	4.80%	4.86%	5.59%
Japan	Osaka Stock Exchange	0.0265	-0.0997	0.0792	0.0060	0.2878	-0.7749	0.9641	0.0257	48.40%	50.86%	49.14%	3.69%	3.69%	3.69%
Japan	Japan Securities DAQS	0.0002	-0.0032	0.0135	0.0105	0.0111	-0.1553	0.8363	0.3066	49.84%	52.48%	49.84%	3.48%	4.11%	3.90%
Jordan	Amman Financial Market	0.0007	-0.0111	0.0219	0.0115	0.0556	-0.6101	1.2322	0.5593	51.90%	47.47%	50.63%	1.27%	3.16%	6.33%
Korea	Korea Stock Exchange	0.0006	-0.0031	0.0037	0.0012	0.1585	-1.3698	1.2959	0.3118	52.43%	50.54%	45.27%	9.05%	5.00%	5.00%
Korea	KOSDAQ	0.0019	-0.0305	-0.0019	-0.0305	0.1291	-1.8001	-0.1572	-1.0881	59.86%	42.96%	47.89%	12.58%	3.82%	4.23%
Malaysia	Kuala Lumpur Stock Exchange	0.0083	0.0018	0.0025	0.0126	1.2481	0.2238	0.3488	1.0572	55.83%	50.75%	48.40%	4.42%	5.17%	3.95%
Netherlands	Euronext Amsterdam	0.0185	-0.0079	-0.0019	0.0087	1.0141	-0.4200	-0.1986	0.6668	56.39%	53.38%	41.35%	2.26%	3.76%	4.51%
New Zealand	New Zealand Stock Exchange	0.0032	-0.0046	-0.0023	-0.0036	0.7991	-1.1855	-0.7950	-0.5062	46.19%	44.67%	50.76%	4.06%	1.52%	3.05%
Norway	Oslo Stock Exchange	0.0468	0.1111	-0.0247	0.1333	2.0222	1.5403	-0.7765	1.9039	55.14%	48.97%	50.21%	4.53%	2.88%	5.76%
Singapore	Stock Exchange of Singapore	0.0083	0.0007	-0.0094	-0.0004	1.3261	0.1539	-1.0210	-0.0291	55.83%	46.78%	46.63%	8.28%	3.07%	2.91%
South Africa	Johannesburg Stock Exchange	-0.0192	-0.0424	-0.0196	-0.0812	-0.3754	-1.0629	-1.3096	-0.8156	62.80%	46.97%	51.45%	17.15%	3.17%	3.69%
Spain	Barcelona Stock Exchange	0.0237	0.0377	-0.0061	0.0553	1.8552	2.7793	-0.4292	2.2234	53.49%	66.67%	48.84%	9.30%	9.30%	4.65%
Sweden	Stockholm Stock Exchange	0.0501	0.0006	-0.0167	0.0340	1.2965	0.0167	-0.6602	0.4850	52.12%	49.63%	49.13%	8.98%	7.48%	9.23%
Switzerland	CHE SWX Swiss Exchange	0.1084	0.0179	0.1061	0.2323	2.9406	0.4922	2.1003	2.9084	66.27%	54.82%	51.20%	10.84%	3.92%	5.42%
Taiwan	Taiwan Stock Exchange	0.1041	-0.0475	0.0010	0.0576	3.4756	-1.7265	0.0299	1.2206	58.37%	48.59%	46.81%	8.59%	5.19%	4.30%
Thailand	Stock Exchange of Thailand (SET)	0.0615	0.0578	0.0432	0.1625	1.5264	1.2955	1.1057	1.5717	49.09%	51.14%	52.51%	2.97%	2.51%	3.65%
United Kingdom	SETS (Electronic Trading Service)	0.0495	-0.0084	-0.0087	0.0324	5.0228	-1.1321	-1.1335	2.0176	67.69%	49.47%	46.18%	7.99%	8.93%	4.23%
United Kingdom	LSE-AIM	0.0015	-0.0060	-0.0004	-0.0050	0.5217	-0.8836	-0.1803	-0.5333	66.53%	65.13%	62.91%	2.63%	2.80%	3.21%
United States	New York Stock Exchange	0.1176	0.0095	-0.0431	0.0840	4.5998	0.9419	-1.5445	2.7475	57.02%	50.15%	47.84%	11.79%	10.46%	7.66%
United States	NASD OTC Bulletin Board	-0.0045	0.0144	0.0412	0.0510	-0.6999	0.5484	1.2396	0.9137	50.23%	49.25%	48.36%	4.40%	4.97%	4.59%
United States	American Stock Exchange	-0.0126	0.0170	0.0413	0.0458	-0.8693	1.3927	1.1080	1.0038	53.44%	52.65%	53.44%	6.29%	6.48%	7.66%
United States	Nasdaq	0.1417	0.0326	-0.0199	0.1544	7.7081	1.8858	-1.5889	4.9050	67.93%	56.27%	51.07%	30.69%	20.74%	17.87%

Table 25: Results for estimation of commonality in liquidity for individual stocks using Equation 9: First difference of effective spread is regressed on value weighted average of first difference of effective spread for the market and value weighted market return.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.2766	-0.0495	-0.1521	0.0749	2.6581	-0.4195	-1.3513	0.3805	56.86%	49.95%	48.91%	4.92%	4.62%	2.83%
Austria	Vienna Stock Exchange	0.0555	0.0106	-0.0281	0.0380	2.6624	0.4222	-1.5033	0.9172	55.56%	46.67%	42.22%	6.67%	1.11%	2.22%
Belgium	Euronext Brussels	0.0394	0.0204	0.0235	0.0833	1.9830	0.7756	1.0376	2.1574	52.36%	52.88%	54.45%	3.14%	4.19%	4.71%
Canada	TSX Venture Exchange	0.0346	0.0786	0.0766	0.1898	0.5399	1.3017	1.4903	1.5646	52.52%	51.82%	51.27%	3.70%	4.00%	3.80%
Canada	Toronto Stock Exchange	0.3530	0.0201	0.2646	0.6377	2.5180	0.1466	2.1012	2.6991	60.26%	51.33%	50.87%	9.38%	4.88%	3.96%
Chile	Santiago Stock Exchange	0.1086	-0.0483	0.0672	0.1275	1.5242	-1.3107	0.7861	0.7778	64.00%	49.60%	51.20%	12.80%	4.00%	1.60%
China	Shanghai Stock Exchange	0.4208	-0.0158	-0.0224	0.3826	22.7152	-1.4830	-2.3628	16.0997	84.98%	41.71%	43.99%	39.66%	3.25%	3.00%
China	Shenzhen Stock Exchange	0.5133	0.0701	0.0712	0.6546	8.4893	1.5768	1.4290	8.4991	77.44%	52.60%	56.82%	20.78%	5.03%	6.98%
Denmark	Copenhagen Stock Exchange	0.1919	0.1328	0.0192	0.3440	1.7684	1.2221	0.2314	1.5995	61.02%	48.59%	53.67%	16.95%	6.78%	9.04%
Egypt	Cairo Stock Exchange	0.1972	0.1957	0.0483	0.4412	2.5026	1.9755	0.7755	2.2926	67.74%	63.71%	58.06%	25.00%	12.90%	7.26%
Finland	Helsinki Stock Exchange	0.0069	0.0041	0.0045	0.0154	0.6584	0.3953	0.3527	0.7151	61.29%	44.35%	48.39%	1.61%	3.23%	0.00%
France	Euronext Paris	0.0191	0.0220	0.0022	0.0433	0.8755	1.0151	0.0731	0.8107	55.22%	50.51%	50.00%	3.69%	3.31%	2.80%
Germany	Berlin Stock Exchange	0.7462	0.0705	-0.0274	0.7893	16.7870	1.3175	-0.6553	7.3023	80.23%	47.62%	44.48%	40.31%	5.22%	3.24%
Germany	Stuttgart Stock Exchange	0.2364	0.0796	0.0025	0.3185	2.7454	1.1316	0.0146	1.6111	62.79%	55.23%	55.23%	2.91%	1.16%	4.65%
Germany	Munich Stock Exchange	0.8480	0.0624	0.0703	0.9807	18.5285	1.3970	1.7519	12.0907	75.06%	53.94%	50.41%	33.85%	11.23%	10.24%
Germany	Frankfurt Stock Exchange	-0.0404	0.0268	0.0283	0.0147	-0.4001	0.2212	0.2225	0.0512	57.91%	49.77%	53.95%	4.19%	3.02%	4.42%
Germany	Duesseldorf Stock Exchange	0.4231	0.0438	0.0247	0.4916	13.1194	1.6918	0.9374	8.8056	74.27%	53.38%	51.59%	26.88%	8.66%	7.26%
Greece	Athens Stock Exchange	0.2169	-0.0120	0.0148	0.2197	7.8233	-0.5168	0.6618	4.3010	70.78%	48.49%	50.30%	17.47%	3.92%	5.42%
Hong Kong	Hong Kong Stock Exchange	0.0095	0.0371	-0.0055	0.0411	0.4014	1.8278	-0.3107	1.0000	52.04%	51.28%	48.13%	3.32%	3.06%	3.49%
India	Bombay Stock Exchange	0.3782	0.0533	0.0749	0.5064	7.0028	0.8777	0.7532	4.2403	73.64%	55.59%	52.00%	15.26%	5.59%	3.59%
India	Indian National Exchange	0.3249	-0.0030	-0.0320	0.2899	10.2005	-0.1232	-1.1799	7.2854	81.76%	43.32%	43.97%	35.50%	5.54%	4.56%
Indonesia	Jakarta Stock Exchange	-0.3124	0.0980	-0.0831	-0.2975	-1.8484	0.5958	-0.4419	-0.7898	47.27%	53.38%	48.87%	1.93%	5.14%	4.18%
Italy	Milano Stock Exchange	-0.0266	-0.0227	0.0124	-0.0369	-0.7364	-0.4582	0.4442	-0.5077	55.16%	40.57%	46.26%	4.27%	5.69%	3.56%
Japan	Tokyo Stock Exchange	0.0053	0.0069	-0.0074	0.0048	0.4644	0.7426	-0.7574	0.2406	53.16%	47.02%	47.21%	3.65%	2.49%	2.07%
Japan	Osaka Stock Exchange	-0.1015	-0.0850	-0.0397	-0.2262	-0.8813	-1.4003	-0.4876	-1.0679	52.09%	48.40%	49.63%	0.98%	1.72%	3.44%
Japan	Japan Securities DAQS	0.0894	0.0561	0.0725	0.2179	3.2611	1.8839	2.8169	4.5952	54.27%	53.21%	50.37%	2.85%	3.27%	3.37%
Jordan	Amman Financial Market	0.0043	-0.0138	0.0589	0.0493	0.1438	-0.2911	1.5902	0.6655	56.96%	46.20%	53.16%	5.06%	5.06%	5.06%
Korea	Korea Stock Exchange	0.0752	-0.0076	-0.0693	-0.0017	3.7343	-0.5214	-4.4078	-0.0662	62.84%	49.46%	39.46%	8.65%	4.19%	1.22%
Korea	KOSDAQ	0.3002	-0.0617	-0.0767	0.1619	4.9206	-0.9658	-1.2053	1.3550	66.40%	45.17%	47.79%	10.06%	3.02%	2.31%
Malaysia	Kuala Lumpur Stock Exchange	0.2369	0.1284	-0.0251	0.3402	5.6957	3.0404	-0.5156	4.1382	62.31%	53.48%	51.22%	4.61%	3.48%	3.10%
Netherlands	Euronext Amsterdam	0.0088	-0.0057	0.0148	0.0180	0.4962	-0.4281	1.1215	0.5002	48.12%	48.87%	48.12%	2.26%	3.01%	3.76%
New Zealand	New Zealand Stock Exchange	-0.0251	-0.0389	0.0282	-0.0359	-0.7817	-1.7256	0.8819	-0.5147	52.28%	45.18%	54.31%	4.06%	2.54%	5.08%
Norway	Oslo Stock Exchange	0.3293	0.1299	-0.1460	0.3131	1.3440	0.4946	-0.6375	0.5842	48.97%	50.21%	46.91%	5.35%	6.17%	7.82%
Singapore	Stock Exchange of Singapore	0.3313	-0.0502	-0.0117	0.2693	3.8800	-0.6001	-0.1511	1.6124	59.20%	47.24%	48.93%	10.28%	2.91%	3.07%
South Africa	Johannesburg Stock Exchange	0.0645	-0.1037	-0.1834	-0.2225	0.2328	-0.3550	-0.6620	-0.3738	62.27%	47.49%	48.02%	16.89%	3.69%	2.90%
Spain	Barcelona Stock Exchange	0.0335	0.0285	0.0038	0.0659	2.5205	2.5209	0.3319	2.6775	57.36%	60.47%	56.59%	9.30%	5.43%	2.33%
Sweden	Stockholm Stock Exchange	-0.0497	0.0604	0.4559	0.4666	-0.1365	0.2562	1.8598	0.7748	59.10%	49.88%	51.62%	8.73%	6.48%	6.98%
Switzerland	CHE SWX Swiss Exchange	0.0970	0.0014	0.0043	0.1027	5.2978	0.1227	0.2711	3.4531	62.95%	52.71%	54.52%	11.14%	5.42%	9.04%
Taiwan	Taiwan Stock Exchange	0.4129	-0.0502	0.0103	0.3729	4.9236	-0.9047	0.1746	2.8550	61.19%	50.81%	48.44%	10.37%	4.59%	3.85%
Thailand	Stock Exchange of Thailand (SET)	0.1247	0.1271	0.0163	0.2681	1.9271	1.9474	0.1906	1.9843	54.79%	53.65%	44.29%	4.79%	5.71%	5.25%
United Kingdom	SETS (Electronic Trading Service)	0.2572	-0.0136	-0.0238	0.2198	3.9262	-0.7810	-0.5625	2.2719	67.45%	46.53%	44.30%	12.46%	4.70%	2.82%
United Kingdom	LSE-AIM	0.0221	-0.0031	0.0135	0.0326	1.2889	-0.2165	0.6167	0.8683	73.44%	72.45%	73.85%	2.63%	2.55%	1.89%
United States	New York Stock Exchange	0.2746	0.0513	-0.0181	0.3077	3.9037	1.4069	-0.5193	3.3483	57.81%	51.25%	49.60%	14.47%	13.74%	11.49%
United States	NASD OTC Bulletin Board	0.1019	-0.1445	0.0996	0.0569	0.6322	-2.1079	0.7921	0.2449	48.55%	48.03%	48.64%	2.44%	3.05%	2.58%
United States	American Stock Exchange	0.1067	0.0165	0.1083	0.2314	2.3774	0.3852	1.9084	2.4751	55.21%	54.62%	50.88%	4.32%	3.93%	7.86%
United States	Nasdaq	0.3961	0.0992	0.0208	0.5162	15.8158	4.9754	0.7204	11.7365	67.71%	56.99%	52.67%	31.97%	24.63%	22.05%

Table 26: Results for estimation of commonality in liquidity for individual stocks using Equation 10: First difference of proportional effective spread is regressed on value weighted average of first difference of proportional effective spread for the market and value weighted market return.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Concrt.	Lag	Lead
Country	Exchange	Mean coefficients				t-Statistics for means				% Positive			% Positive and Significant		
Australia	Nationall Automated Trading	0.4035	0.0174	-0.0396	0.3813	4.6281	0.2199	-0.4103	2.5130	60.39%	50.50%	47.96%	6.21%	3.98%	3.33%
Austria	Vienna Stock Exchange	0.0341	-0.0093	-0.0061	0.0188	0.9314	-0.3836	-0.3418	0.3128	60.00%	48.89%	52.22%	7.78%	7.78%	2.22%
Belgium	Euronext Brussels	0.1034	0.0351	0.0244	0.1628	3.2542	1.5269	1.0967	2.8084	65.45%	52.88%	45.55%	9.95%	3.66%	5.24%
Canada	TSX Venture Exchange	0.2758	0.0226	0.1589	0.4573	5.4817	0.4307	3.2746	4.7749	58.17%	50.57%	53.97%	6.25%	4.25%	4.05%
Canada	Toronto Stock Exchange	0.4054	0.1830	-0.0337	0.5546	3.6780	1.6425	-0.3288	2.7360	62.37%	53.45%	48.85%	10.76%	5.06%	3.59%
Chile	Santiago Stock Exchange	0.1488	-0.1056	-0.0480	-0.0048	3.4432	-2.5434	-1.8478	-0.0707	75.20%	44.00%	35.20%	22.40%	0.00%	3.20%
China	Shanghai Stock Exchange	0.4667	0.0214	-0.0462	0.4419	21.5505	1.1125	-2.0826	14.8033	80.89%	51.92%	46.63%	15.99%	4.09%	3.00%
China	Shenzhen Stock Exchange	0.4371	0.0752	-0.0472	0.4650	6.6400	1.4436	-0.8757	6.2941	75.16%	51.79%	46.27%	16.07%	6.17%	3.57%
Denmark	Copenhagen Stock Exchange	0.0995	0.1087	-0.0657	0.1424	0.9523	0.9917	-0.6030	0.6457	55.93%	57.63%	53.67%	7.91%	6.78%	5.65%
Egypt	Cairo Stock Exchange	0.2373	-0.0329	-0.1730	0.0314	3.2100	-0.3607	-1.3908	0.1375	59.68%	43.55%	46.77%	14.52%	3.23%	4.03%
Finland	Helsinki Stock Exchange	0.0182	0.0226	0.0247	0.0655	1.8718	1.1585	0.6151	0.9967	59.68%	54.03%	44.35%	0.81%	0.00%	0.00%
France	Euronext Paris	0.0174	0.0128	-0.0092	0.0209	0.8086	0.8115	-0.4799	0.5898	54.07%	52.42%	51.15%	2.42%	2.16%	2.29%
Germany	Berlin Stock Exchange	0.1664	-0.1663	-0.0647	-0.0647	0.9100	-1.4430	-0.3973	-0.1906	58.89%	50.40%	51.65%	7.55%	4.84%	3.83%
Germany	Stuttgart Stock Exchange	-0.1253	-0.4438	0.2066	-0.3626	-0.3522	-1.3153	1.1412	-0.6197	59.30%	47.67%	60.47%	3.49%	2.91%	4.65%
Germany	Munich Stock Exchange	0.8489	0.0325	0.1187	1.0001	13.2494	0.7191	1.1219	7.1891	73.32%	49.59%	55.03%	20.83%	2.26%	6.60%
Germany	Frankfurt Stock Exchange	0.2426	-0.0511	0.1671	0.3585	2.5622	-0.3642	0.9822	1.0945	54.42%	45.12%	52.56%	2.79%	2.79%	3.72%
Germany	Duesseldorf Stock Exchange	0.7231	0.2096	0.1530	1.0856	10.5363	3.2272	2.4619	9.4934	68.41%	54.65%	52.87%	20.00%	10.32%	7.52%
Greece	Athens Stock Exchange	0.2241	0.0252	0.1173	0.3667	6.3684	0.7945	3.1196	6.4198	67.47%	53.01%	54.52%	10.24%	3.31%	3.31%
Hong Kong	Hong Kong Stock Exchange	0.0327	0.0416	0.0415	0.1158	0.5166	0.8292	0.7465	0.9644	51.70%	50.60%	50.68%	3.15%	3.83%	3.91%
India	Bombay Stock Exchange	0.5440	0.1210	-0.1223	0.5427	7.8130	1.9354	-2.0334	4.7489	68.29%	55.83%	43.45%	12.46%	6.31%	2.72%
India	Indian National Exchange	0.4581	-0.0484	-0.0444	0.3653	6.9024	-1.4143	-1.1528	3.7065	83.06%	44.30%	40.07%	39.74%	5.21%	4.56%
Indonesia	Jakarta Stock Exchange	0.3375	-0.1447	0.0449	0.2377	1.0888	-0.8216	0.2141	0.5383	51.13%	52.73%	49.52%	4.18%	2.57%	3.54%
Italy	Milano Stock Exchange	0.0148	0.0268	0.0081	0.0497	0.5762	0.7066	0.2560	0.7488	50.89%	48.75%	49.82%	4.98%	4.27%	2.49%
Japan	Tokyo Stock Exchange	0.0237	0.0129	0.0064	0.0431	1.8208	0.9902	0.5530	1.5914	54.31%	47.27%	48.60%	2.98%	2.67%	3.16%
Japan	Osaka Stock Exchange	0.2279	-0.1022	-0.0890	0.0368	1.6963	-0.4283	-0.7198	0.1121	52.83%	50.61%	49.88%	3.19%	2.95%	1.97%
Japan	Japan Securities DAQS	0.1004	0.0101	0.0010	0.1115	3.1154	0.3392	0.0330	2.0499	59.54%	52.05%	50.16%	5.16%	4.53%	3.48%
Jordan	Amman Financial Market	0.0357	-0.0304	0.0468	0.0521	1.0654	-1.0558	1.7035	0.9122	53.16%	48.73%	56.33%	5.06%	4.43%	2.53%
Korea	Korea Stock Exchange	0.0941	0.0113	-0.0869	0.0185	4.4527	0.6627	-5.5065	0.6933	64.05%	50.54%	37.43%	12.30%	4.05%	2.30%
Korea	KOSDAQ	0.0134	-0.0651	-0.0253	-0.0769	0.1749	-0.9473	-0.3450	-0.6536	58.75%	47.99%	48.89%	4.53%	2.62%	2.31%
Malaysia	Kuala Lumpur Stock Exchange	0.5828	0.1240	0.0808	0.7876	10.4147	2.4445	1.5474	8.5465	67.29%	54.79%	51.32%	11.00%	5.55%	4.70%
Netherlands	Euronext Amsterdam	0.0063	-0.0013	-0.0167	-0.0117	0.5762	-0.1734	-1.4469	-0.6721	45.11%	50.38%	42.11%	5.26%	3.76%	0.75%
New Zealand	New Zealand Stock Exchange	0.0255	-0.0199	-0.0030	0.0025	1.0717	-0.7681	-0.1283	0.0439	53.81%	43.15%	53.30%	5.08%	3.55%	3.05%
Norway	Oslo Stock Exchange	-0.1179	0.0570	-0.3462	-0.4071	-0.4931	0.3015	-1.5988	-0.9591	55.14%	54.73%	49.38%	6.58%	7.41%	4.53%
Singapore	Stock Exchange of Singapore	0.2376	0.2964	0.1589	0.6930	2.3372	3.7425	1.5991	3.8970	56.13%	58.90%	56.13%	5.21%	3.83%	5.83%
South Africa	Johannesburg Stock Exchange	-0.1043	0.0677	-0.1840	-0.2206	-0.4629	0.3600	-0.8375	-0.5450	56.20%	51.72%	47.23%	5.54%	3.43%	3.43%
Spain	Barcelona Stock Exchange	0.0493	-0.0033	0.0120	0.0580	2.9356	-0.1978	0.8094	2.5185	60.47%	45.74%	58.91%	6.20%	5.43%	0.78%
Sweden	Stockholm Stock Exchange	-0.1385	0.2879	0.1231	0.2724	-0.5761	1.5695	0.4785	0.6172	59.10%	52.62%	54.11%	9.23%	7.98%	8.48%
Switzerland	CHE SWX Swiss Exchange	0.1720	-0.0044	-0.0415	0.1261	8.7909	-0.4343	-3.6871	5.7509	73.19%	48.49%	44.58%	25.30%	3.92%	4.82%
Taiwan	Taiwan Stock Exchange	0.2554	-0.0474	-0.0966	0.1114	4.1355	-0.8692	-1.7955	1.1145	67.70%	49.63%	49.48%	8.15%	3.85%	2.37%
Thailand	Stock Exchange of Thailand (SET)	0.0980	0.0750	0.0542	0.2272	1.4139	0.9510	0.7312	1.4643	56.62%	54.57%	50.00%	7.08%	5.02%	6.62%
United Kingdom	SETS (Electronic Trading Service)	0.0830	-0.0066	-0.0091	0.0673	6.0810	-0.4669	-0.7207	2.8128	60.05%	46.65%	51.00%	6.23%	2.70%	1.53%
United Kingdom	LSE-AIM	0.0312	0.0704	0.0042	0.1059	1.4701	3.3369	0.1736	2.4512	53.04%	52.30%	48.68%	3.37%	3.13%	2.30%
United States	New York Stock Exchange	0.6850	0.0185	-0.0635	0.6399	14.2535	0.4353	-1.5557	7.6949	78.84%	50.76%	42.55%	24.62%	3.53%	2.49%
United States	NASD OTC Bulletin Board	-0.0237	-0.0554	-0.0084	-0.0876	-0.6796	-1.6307	-0.3441	-1.6915	51.03%	51.17%	49.25%	2.48%	3.14%	2.67%
United States	American Stock Exchange	0.1074	0.0310	0.0705	0.2089	2.6672	0.6503	1.8247	3.0464	54.42%	50.88%	54.62%	5.70%	6.88%	5.89%
United States	Nasdaq	0.5657	0.0085	0.0117	0.5860	11.0988	0.2017	0.3399	7.3427	70.58%	47.73%	50.89%	5.34%	1.56%	2.07%

Table 27: Results for estimation of commonality in liquidity for individual stocks using Equation 11: First difference of percentage spread is regressed on value weighted average of first difference of percentage spread for the market and value weighted market return.

Estimating commonality in liquidity for overall market

Table 28 reports the results for the estimation of (Equation 13) commonality in liquidity with panel data, using first difference of spread and value weighted market variables. For this estimation, we simply pool the entire data into one estimation with a GLS panel data estimation. We have two aims with such an analysis. First, while we are reporting percentage of companies within each equity market that has significant commonality coefficient, we cannot establish a reliable statistical test to check whether calculated percentage is enough to call entire market as highly correlated in changes in liquidity. Such identification may have theoretical as well as practical implications. For the theoretical part, it would be quite troubling if the market consists of smaller sized companies. One of the underlying theories for commonality relies on asymmetric information. If we could identify and exchange (or most of its listed stocks) as highly correlated in liquidity, then it would have to mean asymmetric information become public information relatively quickly. It may also mean that market very interactive and perhaps with a smaller investor base. In terms of practical implications, including several different stocks from the same market (which is identified as high commonality market) would not have the expected diversification impact.

We initially note that the R^2s for within, between and overall are very low for almost all market with the exception of Stuttgart Stock Exchange (.2959 for between R^2). Coefficients for concurrent commonality are quite small and NYSE, CHE-Swiss, Copenhagen, Shenzhen and Shanghai stock exchanges. However, in overall analysis, the levels estimated with this analysis confirm our previous findings and does not render any market as highly correlated in liquidity measure.

		Concrt.	Lag	Lead	Sum	Concrt.	Lag	Lead	Number of groups	Mean obs. for groups	Chi2	R2_w	R2_b	R2_o
Country	Exchange	Mean coefficients				t-Statistics for means								
Australia	Nationall Automated Trading	0.0204	0.0064	0.0006	0.0274	8.6571	2.9929	0.2535	2012	608	421.8432	0.0003	0.0017	0.0003
Austria	Vienna Stock Exchange	0.0317	-0.0311	-0.0114	-0.0108	1.8499	-2.0551	-0.7610	91	203	16.0785	0.0009	0.0031	0.0009
Belgium	Euronext Brussels	0.0742	0.0382	-0.0345	0.0779	1.6190	0.9058	-0.7987	193	367	16.4790	0.0002	0.0000	0.0002
Canada	TSX Venture Exchange	0.0087	0.0005	0.0046	0.0139	5.0594	0.3168	2.5517	2011	563	396.9532	0.0003	0.0026	0.0004
Canada	Toronto Stock Exchange	0.0525	0.0273	0.0074	0.0873	3.7979	2.0387	0.5551	1087	762	79.8142	0.0001	0.0058	0.0001
Chile	Santiago Stock Exchange	0.1031	0.1429	-0.2184	0.0277	0.5026	0.7626	-1.0789	128	416	113.7613	0.0021	0.0478	0.0022
China	Shanghai Stock Exchange	0.0988	0.0164	-0.0513	0.0639	11.6733	1.9294	-6.0080	836	781	1510.6630	0.0023	0.0034	0.0023
China	Shenzhen Stock Exchange	0.1538	0.0331	-0.0460	0.1408	9.3044	2.1306	-2.8457	617	646	813.8452	0.0020	0.0005	0.0020
Denmark	Copenhagen Stock Exchange	0.4870	0.2656	-0.0613	0.6913	2.9191	1.6608	-0.3863	177	770	30.5643	0.0002	0.0000	0.0002
Egypt	Cairo Stock Exchange	0.0499	-0.0191	0.0436	0.0744	2.9762	-1.1806	2.7110	126	356	25.9753	0.0006	0.0117	0.0006
Finland	Helsinki Stock Exchange	0.0075	0.0440	-0.0095	0.0420	0.3578	2.2162	-0.4764	124	891	63.9892	0.0006	0.0092	0.0006
France	Euronext Paris	-0.0074	0.0087	-0.0407	-0.0394	-0.5446	0.7735	-2.8119	792	300	60.1070	0.0003	0.0007	0.0003
Germany	Berlin Stock Exchange	0.0132	0.0621	0.0115	0.0867	1.9467	6.6024	1.6380	2998	344	49.8512	0.0000	0.0742	0.0001
Germany	Stuttgart Stock Exchange	0.0261	-0.0840	0.1434	0.0855	1.4749	-6.6278	8.3364	212	54	141.2834	0.0122	0.2959	0.0123
Germany	Munich Stock Exchange	0.0633	-0.0151	-0.0098	0.0384	6.7659	-1.6912	-1.0823	1743	414	187.9090	0.0003	0.0046	0.0003
Germany	Frankfurt Stock Exchange	0.0012	0.0037	-0.0036	0.0012	0.6849	2.4596	-2.2076	455	274	23.5785	0.0002	0.0032	0.0002
Germany	Duesseldorf Stock Exchange	0.0169	0.0243	0.0045	0.0458	2.5490	3.5452	0.7032	792	476	69.5175	0.0002	0.0000	0.0002
Greece	Athens Stock Exchange	0.0324	0.0019	0.0369	0.0712	2.0997	0.1252	2.4876	332	783	176.5810	0.0007	0.0054	0.0007
Hong Kong	Hong Kong Stock Exchange	0.0015	-0.0032	0.0002	-0.0015	1.5385	-3.6067	0.2233	1178	555	58.7665	0.0001	0.0005	0.0001
India	Bombay Stock Exchange	0.0548	-0.0036	-0.0176	0.0336	4.4986	-0.2963	-1.5287	1255	659	150.8675	0.0002	0.0099	0.0002
India	Indian National Exchange	0.0799	0.0215	-0.0285	0.0728	7.9109	2.1640	-2.9100	307	530	149.6644	0.0009	0.0889	0.0009
Indonesia	Jakarta Stock Exchange	-0.0745	-0.0551	0.0027	-0.1269	-1.9150	-1.4970	0.0710	316	639	52.2450	0.0003	0.0017	0.0003
Italy	Milano Stock Exchange	0.0239	-0.0128	-0.0152	-0.0041	8.6429	-4.3090	-6.2179	283	604	244.1969	0.0014	0.0266	0.0014
Japan	Tokyo Stock Exchange	0.0167	0.0295	0.0216	0.0678	0.9090	1.7576	1.2643	1660	465	338.1960	0.0004	0.0001	0.0004
Japan	Osaka Stock Exchange	0.0009	-0.0006	-0.0009	-0.0006	0.4942	-0.2944	-0.5303	435	375	4.0710	0.0000	0.0040	0.0000
Japan	Japan Securities DAQS	0.0239	-0.0031	-0.0018	0.0191	2.2287	-0.2896	-0.1575	950	487	132.7548	0.0003	0.0070	0.0003
Jordan	Amman Financial Market	0.0034	0.0075	0.0008	0.0116	0.6187	1.4101	0.1560	158	259	12.3721	0.0003	0.0000	0.0003
Korea	Korea Stock Exchange	0.0014	-0.0006	0.0012	0.0021	1.2060	-0.4881	1.0396	740	702	87.9383	0.0002	0.0064	0.0002
Korea	KOSDAQ	0.0012	-0.0015	0.0007	0.0004	0.9480	-1.2510	0.5089	995	533	255.0936	0.0005	0.0004	0.0005
Malaysia	Kuala Lumpur Stock Exchange	0.0523	0.0163	0.0145	0.0831	7.0487	2.3776	1.8617	1066	770	412.8013	0.0005	0.0008	0.0005
Netherlands	Euronext Amsterdam	-0.0040	0.0046	0.0080	0.0086	-0.9910	1.1468	1.9924	134	423	13.9740	0.0002	0.0003	0.0002
New Zealand	New Zealand Stock Exchange	0.0003	-0.0009	0.0010	0.0004	0.1199	-0.4530	0.5144	197	679	30.9171	0.0002	0.0277	0.0002
Norway	Oslo Stock Exchange	0.0109	-0.0012	0.0044	0.0141	1.7339	-0.2158	0.7508	243	590	6.5459	0.0001	0.0419	0.0000
Singapore	Stock Exchange of Singapore	0.0010	0.0097	-0.0015	0.0092	0.2455	2.6183	-0.4211	657	623	111.6543	0.0003	0.0001	0.0003
South Africa	Johannesburg Stock Exchange	0.0061	-0.0069	-0.0025	-0.0032	0.6001	-0.7730	-0.2713	383	576	22.7756	0.0001	0.0009	0.0001
Spain	Barcelona Stock Exchange	0.0335	0.0084	-0.0097	0.0323	3.1527	0.7993	-0.8855	129	862	49.2156	0.0004	0.0102	0.0004
Sweden	Stockholm Stock Exchange	0.0271	-0.0024	-0.0165	0.0082	3.7210	-0.3478	-2.6274	402	654	57.3497	0.0002	0.0005	0.0002
Switzerland	CHE SWX Swiss Exchange	0.1137	-0.0048	0.0164	0.1254	3.8301	-0.1803	0.5543	332	800	56.0709	0.0002	0.0036	0.0002
Taiwan	Taiwan Stock Exchange	0.0482	-0.0235	0.0058	0.0305	3.4098	-1.8166	0.4601	675	660	302.6136	0.0007	0.0019	0.0007
Thailand	Stock Exchange of Thailand (SET)	0.0918	0.0773	0.0236	0.1928	1.7374	1.5370	0.4263	442	671	65.3120	0.0002	0.0116	0.0002
United Kingdom	SETS (Electronic Trading Service)	0.0168	0.0110	-0.0092	0.0185	4.6785	2.5906	-2.2697	852	788	39.3617	0.0001	0.0024	0.0001
United Kingdom	LSE-AIM	0.0018	0.0009	0.0017	0.0045	2.2144	1.0977	2.0533	1225	530	10.2886	0.0000	0.0011	0.0000
United States	New York Stock Exchange	0.1243	-0.0187	-0.0396	0.0661	15.2077	-2.4343	-4.9772	1645	846	421.5502	0.0003	0.0014	0.0003
United States	NASD OTC Bulletin Board	-0.0013	0.0037	-0.0008	0.0016	-1.6033	5.2698	-2.0230	2159	399	46.3457	0.0001	0.0037	0.0001
United States	American Stock Exchange	-0.0037	0.0008	0.0037	0.0007	-3.1091	0.7048	3.2294	509	739	37.8809	0.0001	0.0049	0.0001
United States	Nasdaq	0.0432	0.0046	0.0262	0.0741	5.9648	0.6419	3.6787	2753	749	291.1132	0.0001	0.0003	0.0001

Table 28: Results for the estimation of (Equation 13) commonality in liquidity with panel data, using first difference of spread and value weighted market variables.

Logistic estimation for commonality of individual stocks

Table 30 reports the results for the panel logistic estimation of (Equation 14) commonality in liquidity using first difference of spread and value weighted market variables. With this analysis, we evaluate individual factors that change the likelihood of stocks having commonality. The discussion for each variable included in the study is provided in previous sections. Correlation coefficients for the factors affecting the likelihood of a stock having commonality are provided in Table 29.

We estimate four separate models in which the main difference is the normalization of some of the variables and controlling for market specific factors. First, we begin by estimating the random effects panel logistic GLS estimation for mean percentage spread, mean market capitalization ratio, standard deviation of return and skewness of return. All of these variables are statistically significant at 1% level. The interpretations are as follows; as the percentage spread increases, likelihood of a stock having commonality decreases. In other words, as stocks become more liquid, they are more likely to have commonality. As companies' relative (to the market) size gets bigger, its likelihood of having commonality increases. As the standard deviation of return gets higher, the likelihood of companies having commonality also increases. While previous variables were in accordance with our expectations, standard deviation of return is contrary to our expectations. Our interpretation would be that market makers (or investors) may act together to get rid of such stocks (thus the commonality). It is also possible that higher standard deviation leads to higher potential for profits. Skewness of returns however, is the main risk measure of interest for us. This is due to our argument that as stocks have more and more number of days with negative returns, investors start to be more cautious (and vice versa). Indeed, we find that as skewness gets smaller (more frequent positive

returns), likelihood of a company having commonality increases (investors start paying more attention to such stocks). As skewness gets bigger (more frequent negative returns), likelihood of a company having commonality decreases (investors start avoiding such stocks). Other variables discussed in the previous section are either statistically insignificant or their impact is zero.

In our final estimation, we control for market specific factors including short-term interest rates, common/civil law, mean skewness of return for the market, relative US Dollar size of the market and mean coefficient of variation for the market. We find all these factors to be statistically significant at 1% level. We find that likelihood of commonality is higher in markets that are operating under common law, with higher interest rates, relatively bigger in overall size, with higher coefficient of variation and lower possibility of market crash. Thus, market-wide factors play as much role in explaining commonality as idiosyncratic factors.

	Mean percentage spread	Mean market capitalization ratio	Standard deviation of return	Skewness of return	Coefficient of variation	Mean price	Mean spread	Mean return	Common/ Civil law	Skewness of market capitalization ratio
Mean percentage spread	1									
Mean market capitalization ratio	-0.0640	1								
Standard deviation of return	0.5408	-0.0818	1							
Skewness of return	0.0574	-0.0236	0.0579	1						
Coefficient of variation	0.0021	0.0012	0.0009	0.0034	1					
Mean price	-0.0774	0.0036	0.0027	0.0115	0.0006	1				
Mean spread	-0.0215	-0.0013	0.0042	0.0132	0.0002	0.6093	1			
Mean return	-0.0013	-0.0049	0.0204	0.1826	0.0041	-0.0859	-0.0571	1		
Common/Civil law	0.1895	-0.0780	0.2320	0.0395	-0.0019	-0.1264	-0.0799	0.1044	1	
Skewness of market capitalization ratio	0.3105	-0.0741	0.3126	0.0130	-0.0014	0.0104	0.0041	0.0158	0.4500	1

	Mean percentage spread	Mean market capitalization ratio	Standard deviation of return	Skewness of return	Coefficient of variation	Relative mean price	Relative mean spread	Relative mean return	Common/ Civil law	Skewness of market capitalization ratio
Mean percentage spread	1									
Mean market capitalization ratio	-0.064	1								
Standard deviation of return	0.5408	-0.0818	1							
Skewness of return	0.0574	-0.0236	0.0579	1						
Coefficient of variation	0.0021	0.0012	0.0009	0.0034	1					
Relative mean price	-0.0537	0.1039	-0.0523	-0.0195	0	1				
Relative mean spread	0.0719	0.0455	0.0154	-0.0034	0.0011	0.7819	1			
Relative mean return	0.0253	0.0008	-0.0259	0.0369	0.0007	0.0023	0.0069	1		
Common/Civil law	0.1895	-0.078	0.232	0.0395	-0.0019	0	0	0	1	
Skewness of market capitalization ratio	0.3105	-0.0741	0.3126	0.013	-0.0014	0	0	0	0.45	1

	Mean percentage spread	Mean market capitalization ratio	Standard deviation of return	Skewness of return	Coefficient of variation	Mean price	Common/ Civil law	Skewness of market capitalization ratio		
Mean percentage spread	1									
Mean market capitalization ratio	-0.064	1								
Standard deviation of return	0.5408	-0.0818	1							
Skewness of return	0.0574	-0.0236	0.0579	1						
Coefficient of variation	0.0021	0.0012	0.0009	0.0034	1					
Mean price	-0.0774	0.0036	0.0027	0.0115	0.0006	1				
Common/Civil law	0.1895	-0.078	0.232	0.0395	-0.0019	-0.1264	1			
Skewness of market capitalization ratio	0.3105	-0.0741	0.3126	0.013	-0.0014	0.0104	0.45	1		

Table 29: Correlation coefficients for the factors affecting the likelihood of a stock having commonality.

	Estimation 1				Estimation 2				Estimation 3				Estimation 4			
	Coeff.	Std. Err.	z	P-value	Coeff.	Std. Err.	z	P-value	Coeff.	Std. Err.	z	P-value	Coeff.	Std. Err.	z	P-value
Mean Percentage Spread	-4.0384	0.4768	-8.4700	0.0000	-1.5712	0.3628	-4.3300	0.0000	-3.8323	0.4690	-8.1700	0.0000	-3.9060	0.4762	-8.2000	0.0000
Mean Market Capitalization Ratio	5.2790	1.2120	4.3600	0.0000	4.6410	1.1324	4.1000	0.0000	5.2622	1.2041	4.3700	0.0000	5.2414	1.1911	4.4000	0.0000
Standard Deviation of Return	11.0244	1.0567	10.4300	0.0000					10.7462	1.0524	10.2100	0.0000	10.7739	1.0532	10.2300	0.0000
Coefficient of Variation					-0.3359	0.6337	-0.5300	0.5960								
Skewness of Return	-0.0628	0.0145	-4.3400	0.0000	-0.0450	0.0128	-3.5100	0.0000	-0.0660	0.0141	-4.6700	0.0000	-0.0658	0.0141	-4.6600	0.0000
Mean Price	0.0000	0.0000	-2.5300	0.0120	0.0000	0.0000	-1.6700	0.0950								
Mean Spread	0.0000	0.0001	-0.1900	0.8470	0.0000	0.0001	-0.3900	0.6950								
Mean Return	-5.3731	6.2748	-0.8600	0.3920	-0.1762	13.7602	-0.0100	0.9900								
Relative Mean Price													-0.0042	0.0082	-0.5200	0.6040
Relative Mean Spread													0.0085	0.0070	1.2200	0.2220
Relative Mean Return													0.0000	0.0001	0.3300	0.7430
Short-Term Interest Rates													5.8606	1.1160	5.2500	0.0000
Common/Civil Law													0.2493	0.0463	5.3800	0.0000
Mean Skewness of Return													-0.2072	0.0893	-2.3200	0.0200
Relative USD Market Capitalization													3378.1170	477.5643	7.0700	0.0000
Mean Coefficient of Variation													24.8428	4.7560	5.2200	0.0000
Constant	-2.3863	0.0373	-63.9300	0.0000	-2.0862	0.0254	-82.2300	0.0000	-2.3957	0.0373	-64.2100	0.0000	-2.3978	0.0375	-63.8900	0.0000

Table 30: Results of the random effects panel logistic estimation to evaluate the impact of idiosyncratic and market factors on likelihood of companies having commonality in liquidity.

Conclusion

Our primary aim with this study is to present international evidence of commonality in liquidity which received some attention in the recent years. While many studies evaluated such liquidity sensitivities within asset pricing models, its implications are more variant. Common movements in liquidity within equity markets have theoretical implications as well as practical. Most importantly, it is suggested that such co-movements may lead to liquidity crunches or possibly to financial crisis. For the theoretical point of view, we need to consider asset pricing implications as well as market microstructure aspects. We also believe that through commonality in liquidity, it may be possible to argue that time variant investor behavior (or investor preferences) may be measured.

Our conclusions center around three arguments. First, we argue that measurement is a major cause of concern for commonality and perhaps for liquidity studies in general. We present evidence that using percentage change instead of first difference may present a positive bias. We also present evidence that using value weighted market variables may be more reliable for commonality studies, considering that commonality may be more visible among relatively larger companies. Second, we present evidence that commonality is an international phenomenon. While the level is higher for more developed markets such as US, UK, Germany and Japan, it is still a concern for other markets due to international integrations. Finally, we argue that market factors as well as idiosyncratic factors have influence on stocks' likelihood of having commonality and therefore markets having different percentage of companies with commonality. In terms of the firm specific factors, level of percentage spread, relative size, standard deviation of return and skewness of return are presented as significant factors to

consider in commonality analysis. In terms of the market factors, short-term interest rates, common/civil law, mean skewness of return for the market, relative US Dollar size of the market and mean coefficient of variation for the market explain differences in levels of commonality in equity markets around the world.

Bibliography

Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics , 77* (2), 375–410.

Admati, A. R., & Pfleiderer, P. (1988). A theory of intraday patterns: volume and price variability. *Review of Financial Studies , 1* (1), 3–40.

Affleck-Graves, J., Hegde, S. P., & Miller, R. E. (1994). Trading mechanisms and components of the bid-ask spread. *Journal of Finance , 49* (4), 1471–1488.

Alexander, S. S. (1964). Price movements in speculative markets. *Industrial Management Review , 5* (2), 25-46.

Alexander, S. S. (1961). Price movements in speculative markets: trends or random walks. *Industrial Management Review , 2* (2), 7–26.

Amihud, Y. (2002). Illiquidity & Stock Returns: Cross Section and Time Series Effects. *Journal of Financial Markets , 5*, 31–56.

Amihud, Y., & Mendelson, H. (1982). Asset price behavior in a dealership market. *Financial Analysts Journal , 38* (3), 50–59.

Amihud, Y., & Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics , 17* (3), 223–249.

Amihud, Y., & Mendelson, H. (1980). Dealership market: market making with inventory. *Journal of Financial Economics , 8* (1), 31–53.

Amihud, Y., Mendelson, H., & Lauterbach, B. (1997). Market microstructure and securities values: evidence fromthe Tel Aviv exchange. *Journal of Financial Economics , 45* (3), 365–390.

Amihud, Y., Mendelson, H., & Wood, R. A. (1990). Liquidity and the 1987 stock market crash. *Journal of Portfolio Management , 16* (3), 65–69.

Atje, R., & Jovanovic, B. (1993). Stock Markets and Development. *European Economic Review , 37* (2/3), 632–640.

Bekaert, G. (1995). Market Integration and Investment Barriers in Emerging Equity Markets. *World Bank Economic Review , 9*, 75–107.

Bekaert, G., & Harvey, C. R. (1997). Emerging Equity Market Volatility. *Journal of Financial Economics , 43*, 29–78.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2007). Liquidity and Expected Returns: Lessons from Emerging Markets. *Review of Financial Studies , 20* (6), 1783-1831.

Benston, G. J. (1974). Determinants of bid-asked spreads in the over-the-counter market. *Journal of Financial Economics , 1* (4), 353–364.

Bollerslev, T. (1986). Generalized Autoregressive Conditional Heteroscedasticity. *Journal of Econometrics , 31*, 307–327.

Brock, W., Lakonishok, J., & LeBaron, B. (1992). Simple technical trading rules and the stochastic properties of stock returns. *Journal of Finance , 47* (5), 1731–1764.

Brockman, P., Chung, D. Y., & Perignon, C. (2008). Commonality in Liquidity: A Global Perspective. *Journal of Financial and Quantitative Analysis , 25* (4).

Caballe, J., & Krishnan, M. (1994). Imperfect competition in a multi-security market with risk neutrality. *Econometrica , 62* (3), 695–704.

Chalmers, J. M., & Kadlec, G. B. (1998). An empirical examination of the amortized spread. *Journal of Financial Economics , 48*, 159–188.

Chen, J., Hong, H., & Stein, J. (2001). Forecasting crashes: trading volume, past returns, and conditional skewness in stock prices. *Journal of Financial Economics , 61* (3), 345-381.

Chordia, T., Roll, R., & Subrahmanyam, A. (2000). Commonality in liquidity. *Journal of Financial Economics , 56* (1), 3–28.

Chordia, T., Roll, R., & Subrahmanyam, A. (2001). Market liquidity and trading activity. *Journal of Finance , 56* (2), 501–530.

Chordia, T., Roll, R., & Subrahmanyam, A. (2002). Order imbalance, liquidity, and market returns. *Journal of Financial Economics , 65* (1), 111-130.

Chowhdry, B., & Nanda, V. (1991). Multimarket trading and market liquidity. *Review of Financial Studies , 24*, 483–511.

Clark, R. A., McConnell, J. J., & Singh, M. (1992). Seasonalities in NYSE bid-ask spreads and stock returns in January. *Journal of Finance , 47*, 1999–2014.

Cooper, S. K., Goth, J. C., & Avera, W. E. (1985). Liquidity, exchange listing and common stock performance. *Journal of Economics and Business , 37*, 19–33.

Copeland, T., & Galai, D. (1983). Information effects on the bid-ask spread. *Journal of Finance , 38*, 1457–1469.

Desai, A., Nimalendran, M., & Venkataraman, S. (1998). Changes in trading activity following stock splits and their effect on volatility and the adverse information component of the bid-ask spread. *Journal of Financial Research , 21*, 159–184.

Domowitz, I., & Wang, X. (2002). Liquidity, liquidity commonality and its impact on portfolio theory. *Working Paper, Penn State University* .

Domowitz, I., Glen, J., & Madhavan, A. (2001). Liquidity, Volatility, and Equity Trading Costs Across Countries and Over Time. *International Finance* , 221–255.

Draper, P., & Paudyal, K. (1997). Microstructure and seasonality in the UK equity market. *Journal of Business Finance and Accounting , 24*, 1177–1204.

Easley, D., & O'Hara, M. (1987). Price, trade size, and information in securities markets. *Journal of Financial Economics , 19*, 69–90.

Easley, D., Hvidkjaer, S., & O'Hara, M. (2002). Is information risk a determinants of asset returns? *Journal of Finance , 58*, 2185–2210.

Eleswarapu, V. R. (1997). Cost of transacting and expected returns in the NASDAQ market. *Journal of Finance , 52*, 2113–2127.

Fabre, J., & Frino, A. (2004). Commonality in liquidity: Evidence from the Australian Stock Exchange. *Accounting and Finance , 44*, 357–368.

Fama, E. F., & Blume, M. E. (1966). Filter rules and stock market trading. *Journal of Business , 39*, 226–241.

Fortin, R. D., Grube, R. C., & Joy, O. M. (1989). Seasonality in NASDAQ dealer spreads. *Journal of Financial and Quantitative Analysis , 24*, 395–407.

Foster, F. D., & Viswanathan, S. (1995). Can speculative trading explain the volume-volatility relation? *Journal of Business and Economic Statistics , 13*, 379–396.

Foster, F. D., & Viswanathan, S. (1993). Variations in trading volume, return volatility, and trading costs: Evidence on recent price formation models. *Journal of Finance , 48*, 187–211.

Friederich, S., & Payne, R. (2002). Dealer liquidity in an auction market: evidence from the London Stock Exchange. *Working paper* .

Galariotis, E. C., & Giouvris, E. (2007). Liquidity Commonality in the London Stock Exchange. *Journal of Business Finance & Accounting , 34*, 374–388.

Garbade, K., & Silber, W. (1979). Structural organization of secondary markets: clearing frequency, dealer activity and liquidity risk. *Journal of Finance , 34*, 577–593.

Gibson, R., & Mougeot, N. (2004). The pricing of systematic liquidity risk: Empirical evidence from the US stock market. *Journal of Banking & Finance , 28*, 157–178.

Glosten, L., & Milgrom, P. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics , 14*, 71–100.

Grossman, S., & Miller, M. (1988). Liquidity and Market Structure. *Journal of Finance , 43*, 617–633.

Harvey, C. (1995). Predictable risk and returns in emerging markets. *Review of Financial Studies , 8*, 773–816.

Hasbrouck, J., & Seppi, D. J. (2001). Common Factor in Prices, Order Flows and Liquidity. *Journal of Financial Economics , 59*, 383–411.

Hiemstra, C., & Jones, J. D. (1994). Testing for linear and nonlinear Granger causality in the stock price–volume relation. *Journal of Finance , 49*, 1639–1664.

Ho, T., & Stoll, H. R. (1981). Optimal dealer pricing under transactions and return uncertainty. *Journal of Financial Economics , 9*, 47–73.

Huberman, G., & Halka, D. (2001). Systematic Liquidity. *Journal of Financial Research , 24*, 161–178.

Jacoby, G., Fowler, D. J., & Gottesman, A. A. (2000). The capital asset pricing model and the liquidity effect: A theoretical approach. *Journal of Financial Markets , 3*, 69–81.

Jain, P. (2002). Institutional design and liquidity on stock exchanges. *Working paper, Indiana University* .

Karpoff, J. M. (1987). The relation between price changes and trading volume: A survey. *Journal of Financial and Quantitative Analysis , 22*, 109–126.

Khan, W. A., & Baker, H. K. (1993). Unlisted trading privileges, liquidity and stock returns. *Journal of Financial Research , 16*, 221–236.

Koski, J. L. (1996). A microstructure analysis of ex-dividend stock price behavior before and after the 1984 and 1986 tax reform acts. *Journal of Business , 69*, 313–338.

Kyle, A. (1985). Continuous auctions and insider trading. *Econometrica , 53*, 1315–1335.

Lakonishok, J., & Maberly, E. (1990). The weekend effect: Trading patterns of individual and institutional investors. *Journal of Finance , 45*, 231–243.

Lee, C. M., Mucklow, B., & Ready, M. J. (1993). Spreads, depths and the impact of earnings information: an intraday analysis. *Review of Financial Studies , 6*, 345–374.

Lee, K. H. (2005). The World Price of Liquidity Risk. *Working paper, Ohio State University* .

Lesmond, D. A. (2002). The costs of equity trading in emerging markets. *Working paper, Tulane University* .

Lesmond, D. A., Ogden, J. P., & Trzcinka, C. A. (1999). A New Estimate of Transaction Costs. *Review of Financial Studies , 12* (5), 1113–1141.

Levine, R., & Zervos, S. (1998). Stock Markets, Banks, and Economic Growth. *American Economic Review , 88*, 537–558.

Lin, J., & Myers, S. C. (2006). R^2 Around the World: New Theory and New Tests. *CFA Digest , 36* (3), 45-47.

Lo, A. W., Mamaysky, H., & Wang, J. (2001). Asset prices and trading volume under fixed transactions costs. *Working paper, MIT* .

Lockwood, L. J., & Linn, S. C. (1990). An examination of stock market return volatility during overnight and intraday periods, 1964-1989. *Journal of Finance , 45*, 591–601.

Madhavan, A. (2000). Market Microstructure: A Survey. *Journal of Financial Markets , 3*, 205–258.

Madhavan, A. (1992). Trading mechanisms in securities markets. *Journal of Finance , 47*, 607–641.

Martinez, M. A., Nieto, B., Rubio, G., & Tapia, M. (2005). Asset pricing and systematic liquidity risk: An empirical investigation of the Spanish stock market. *International Review of Economics and Finance , 14*, 81–103.

Mclnish, T. H., & Wood, R. A. (1992). An analysis of intraday patterns in bid/ask spreads for NYSE stocks. *Journal of Finance , 47*, 753–764.

Menyah, K., & Paudyal, K. (1996). The determinants and dynamics of bid-ask spreads on the london stock exchange. *Journal of Financial Research , 19*, 377–394.

O'Hara, M., & Oldfield, G. (1986). The microeconomics of market making. *Journal of Financial and Quantitative Analysis , 21*, 361–376.

Pastor, L., & Stambaugh, R. F. (2003). Liquidity Risk and Expected Stock Returns. *Journal of Political Economy , 111*, 642–685.

Pettengill, G. N., & Jordan, B. D. (1988). A comprehensive examination of volume effects and seasonality in daily security returns. *Journal of Financial Research , 11*, 57–70.

Stoll, H. (1978b). The pricing of security dealer services: an empirical study of NASDAQ stocks. *Journal of Finance , 33*, 1153–1172.

Stoll, H. (1978a). The supply of dealer services in securities markets. *Journal of Finance , 33*, 1133–1151.

Sweeney, R. J. (1988). Some new filter rule tests: Methods and results. *Journal of Financial and Quantitative Analysis , 23*, 285–300.

Tinic, S. M. (1972). The Economics of Liquidity Services. *Quarterly Journal of Economics , 86*, 79–93.

Wei, P. H. (1992). Intraday Variations in Trading Activity, Price Variability, and the Bid-Ask Spread. *Journal of Financial Research , 15*, 265–276.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association , 57*, 348–368.

Appendices

Data preparation

The data is provided by Reuters through "QuoteCenter" application via Equis International. The access to data is through a "Dynamic Data Exchange" (DDE). Each observation for each variable is down-loaded individually using DDE. While several applications provide platforms for DDE, Microsoft Office retrieves the data in "XLTable" binary format rather than "text strings". The superiority of "XLTable" is in terms of speed of retrieval and reliability of data retrieved. Any connection error stops the complete DDE. However, with the "text strings", the transmission of data continues with interrupted (patchy) DDE response. The drawback with the Microsoft Office applications is the discontinued support for DDE for the most recent version. Therefore, we use the Microsoft Excel version 2003 for data retrieval from Reuters' QuoteCenter servers (Visual Basic version 6.3 (VB6) for Microsoft Excel in specific). The initial stage is to download, format and prepare the data. At the later stage, we calculate return, liquidity and risk variables for individual stocks as well as for each country.

Types of data available through DDE

Historic trading data

Historic data is provided through "HIST" data type. The frequencies available include tick, minute, hour, day, week, month and annual. For the end-of-day values, we use the daily data which has a backfill dependent on the stock. For most of the stocks, this period extends to their IPOs. Earliest and latest dates available for each stock for intraday and for the daily data is available upon request. The variables included in HIST for daily data include; date, last sale, open, high, low, bid, ask and volume.

Corporate data

Corporate data is provided through two separate data types; “TKR” and “PAGE”. Through TKR we obtain fundamental variables for the stocks including; company name, number of shares outstanding, market capital, earnings per share ratio and price to earnings ratio. Through PAGE we obtain dividend variables including; dividend announcement year, dividend amount paid and dividend payment date. The backfill for dividend variables is until 1989.

Step 1: List of stock symbols

Reuters QuoteCenter has an interface that is designed for the investors. The list of all symbols allows investors to choose individual stocks to form a portfolio up to 500 securities. It also includes non-equity securities such as foreign exchange rates, bonds, futures and various indices. The list of all symbols is obtained from Reuters directly and processed further to eliminate non-equity symbols.

Symbol list

The file that contains the list of symbols is obtained from Reuters QuoteCenter in binary format (.dta). We process this data file further to extract all symbols. The symbols for equities combine country codes (two letters), stock symbols (various number of letters) and stock specification (in some countries new issue, A or B type etc.). The initial two parts of combined symbol are separated with a semicolon. The last part is separated with a period. Any symbol that does not match this format is excluded from the symbol database. These include bonds, currencies and futures. The binary format is converted to text format (ASCII) and any end-of-file characters are removed to make sure that further steps will not halt symbol retrieval unexpectedly.

Symbol list data availability

The symbols data contains all equity symbols. However, it also includes symbols for indices and for equities that do not have any data available. Thus, in order to clean the symbol list from unusable sym-

bols, we establish a DDE link and download company name and number of shares outstanding. If a symbol belongs to an index then the number of shares outstanding will be equal to zero. If a symbol belongs to an equity for which no data is available then the DDE response will either be "<NAUTH>" or "<NFND>". Both responses will be excluded from the symbol list. We perform this process for each country separately and prepare a country symbol list for each country.

At this stage we prepare a list of countries with country codes, regions and foreign exchange rates. This list is prepared manually. Foreign exchange rates are from Reuters as well and correspond to each country's currency value for each U.S. Dollar as of January, 2008.

Step 2: Downloading the data

We use the symbol list generated for each country to download the data for each country separately. The data includes dividend variables, corporate variables, end-of-day variables and intraday variables. Each group of variables will be saved in separate text files for each country.

Dividends

For each stock symbol in each country, we download the dividend data through "PAGE" data type. Dividend information is provided as pages of five columns. Each column contains data for a year. Each page is in a text format and we designate coordinates for each column to extract dividend data. In terms of reliability, data through "PAGE" is received as one variable. Thus, there is no risk of receiving patchy DDE response. In order to download all dividend information, we repeat the same process until no dividend information is left in the following page of five years. The earliest date for dividend information is 1989. Dividend variables include, dividend announcement year, dividend amount and dividend payment date. Dividend data for stocks are combined to produce dividend data for each country separately.

Fundamentals

For each stock symbol in each country, we download the fundamental corporate data through "TKR" data type. This type of data is provided through "XLTable" data format and does not require any further formatting. Thus, we retrieve the variables and record them to country data files where variables for stocks are combined. Fundamental variables include; company name, earnings per share, market capitalization, price to earnings ratio, shares outstanding, long-term volatility and short-term volatility.

End-of-day values

For each stock symbol in each country, we download the end-of-day data through "HIST" data type. This type of data is provided through "XLTable" data format and does not require any further formatting. Daily data for each stock is retrieved and combined into country data files. End-of-day variables include; date, open, high, low, bid, ask, last sale and volume. The downloaded data is for 5,000 trading days to include all end-of-day values until 1989.

Intraday values

For each stock symbol in each country, we download the intraday data through "HIST" data type. This type of data is provided through "XLTable" data format and does not require any further formatting. The intraday data has a limitation of 52 weeks of backfill. Thus, for each trading day for the period starting from January 2007, we download the intraday transactions for each stock and combine them into country data files. The intraday variables include; date, time, last sale and size of trade. In order to keep the data at a manageable size, we choose the intraday frequency as five minutes.

Downloaded variables

Symbol List	Dividends	Fundamentals	End-of-day values
Symbol	Symbol	Symbol	Symbol
	Dividend Announcement Year	Company Name	Date
	Text Reply from DDE	Earnings Per Share	Open
	Dividend Amount	Market Capitalization	High
	Dividend Date	Price/Earnings	Low
		Shares Outstanding	Bid
		6 Months volatility	Ask
		Short Term Volatility	Last Sale
			Volume

Table 31: Downloaded variables

Vita

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