

Securities

Market Quality Indicators

January - December 2011

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Introduction

Welcome to the first edition of the SGX Securities Market Quality Indicators report. This report provides information on trading activity, liquidity, volatility and trading costs on the SGX securities market in 2011.

The report aims to provide a quantitative overview of trading activity and market dynamics to enable investors to better evaluate “market quality” and highlight trading opportunities available on SGX.

The report considers these factors in the context of:

- i. Overall securities market
- ii. Large-capitalisation stocks (30 Straits Times Index Components)
- iii. Mid-capitalisation stocks (50 Straits Times Mid Cap Index Components)
- iv. Small-capitalisation stocks (All Remaining Stocks)

This is a half-yearly publication prepared by SGX in conjunction with the Capital Markets Cooperative Research Centre in Australia.



About Singapore Exchange

Singapore Exchange (SGX) is the Asian Gateway, connecting investors in search of Asian growth to corporate issuers in search of global capital. SGX represents the premier access point for managing Asian capital and investment exposure, and is Asia’s most internationalised exchange with more than 40% of companies listed on SGX originating outside of Singapore. SGX offers its clients Asia’s broadest span of equity index derivatives, uniquely centred on Asia’s three largest economies – China, India and Japan.

In addition to offering a fully integrated value chain from trading and clearing, to settlement and depository services, SGX is also Asia’s pioneering central clearinghouse. Headquartered in Asia’s most globalised city, and centred within the AAA strength and stability of Singapore’s island nation, SGX is a peerless Asian counterparty for the clearing of financial and commodity products.

About Capital Markets Cooperative Research Centre

The Capital Markets Cooperative Research Centre (CMCRC) was formed in 2001 by a group of researchers, universities and industry partners, to bring together the best in innovative research and technology to the capital markets domain.

Positioned as a bridge between the practical needs of capital markets and pioneering academic research, CMCRC was started under the auspices of the Federal Department of Education Science and Technology CRC program and is now run by the Department of Innovation, Industry, Science and Research of Australia.

Executive Summary

The market environment in 2011, especially from August to December, was punctuated by budget issues and credit rating downgrades in the United States, debt concerns in much of the Euro-zone, political change in North Africa and the Middle East, and continued concerns about global growth. Interest rates stayed extremely low by historical standards, currencies were volatile, and global markets were volatile. The Singapore market was not immune to either the volatility, especially in August, or the reduced trading volumes, particularly nearer the year-end.

During the year, SGX improved Singapore's market microstructure with various initiatives. We reduced the minimum bid size for most securities in July and introduced all-day trading from August. Our new Reach trading engine began operating mid-August, significantly reducing latency and improving capacity. Some of these improvements clearly improved market quality in various ways while the impact of other enhancements is more difficult to quantify.

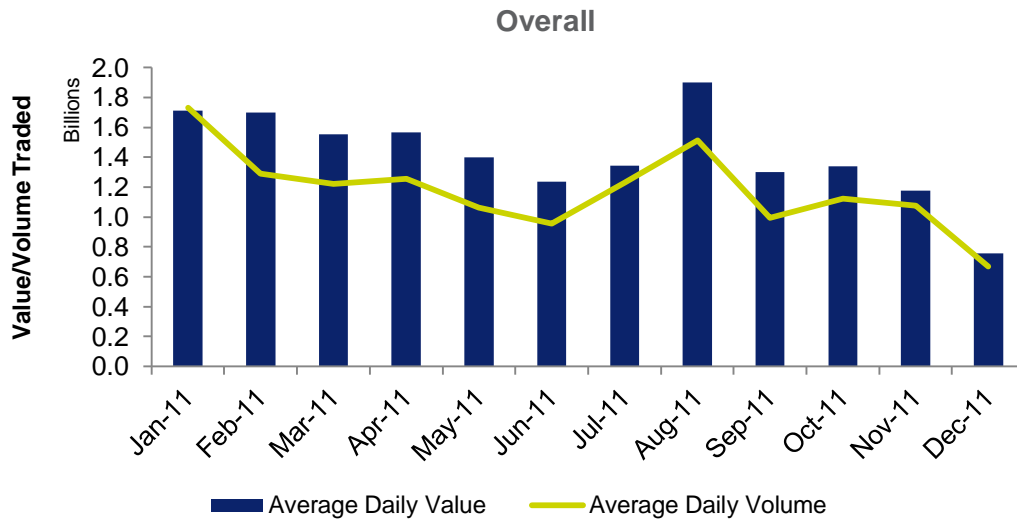
Key findings for the year are:

- Price volatility spiked in August 2011 amid extreme market uncertainty and a steep increase in activity.
- Liquidity declined from August 2011 to the year-end.
- Trading costs as indicated by spreads declined in July 2011 before stabilizing in December 2011, likely the result of initiatives such as the reduction of minimum bid sizes.

SGX will continue to roll out enhancements to our infrastructure and market microstructure to further improve the market for all participants.

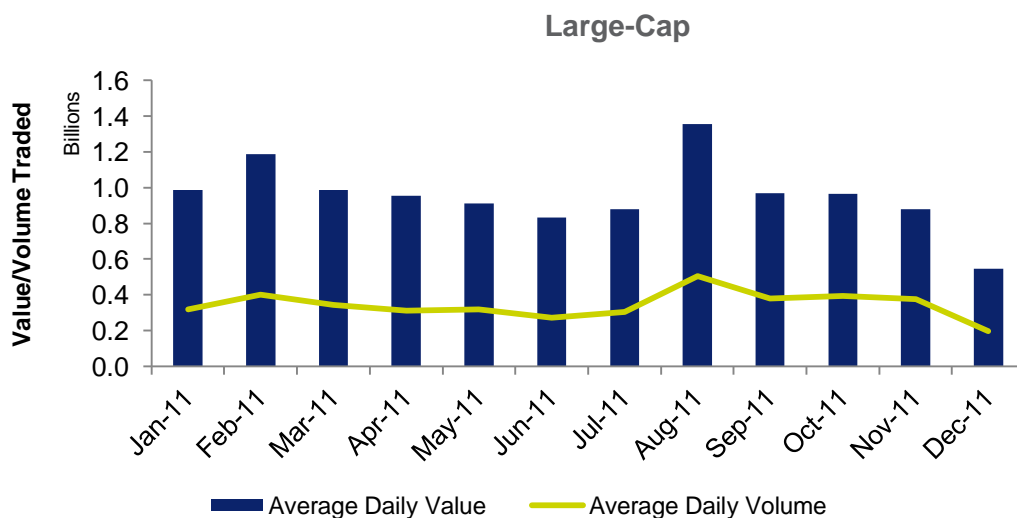
1. Trading Activity

1.1. Average Daily Value and Volume

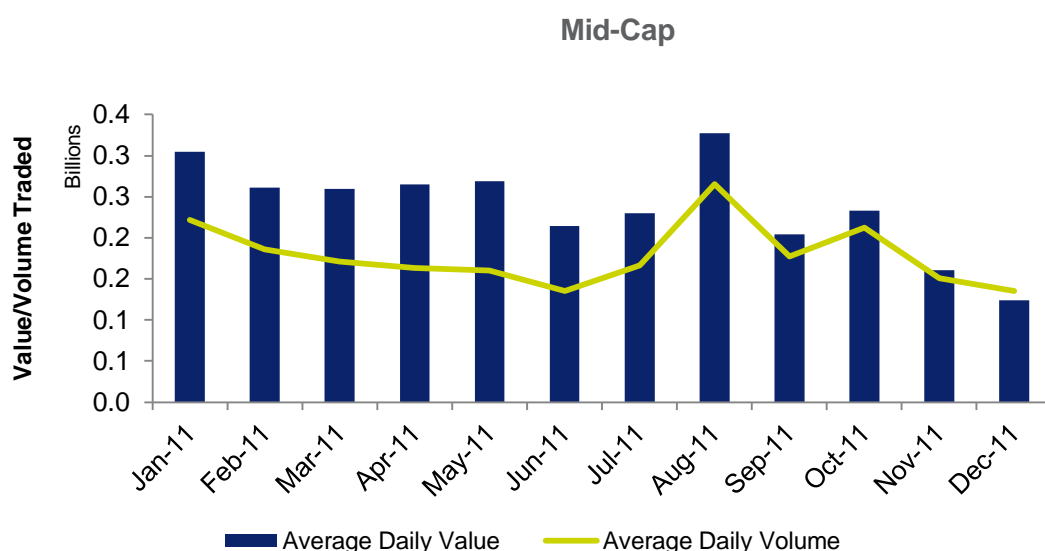


Source: SGX

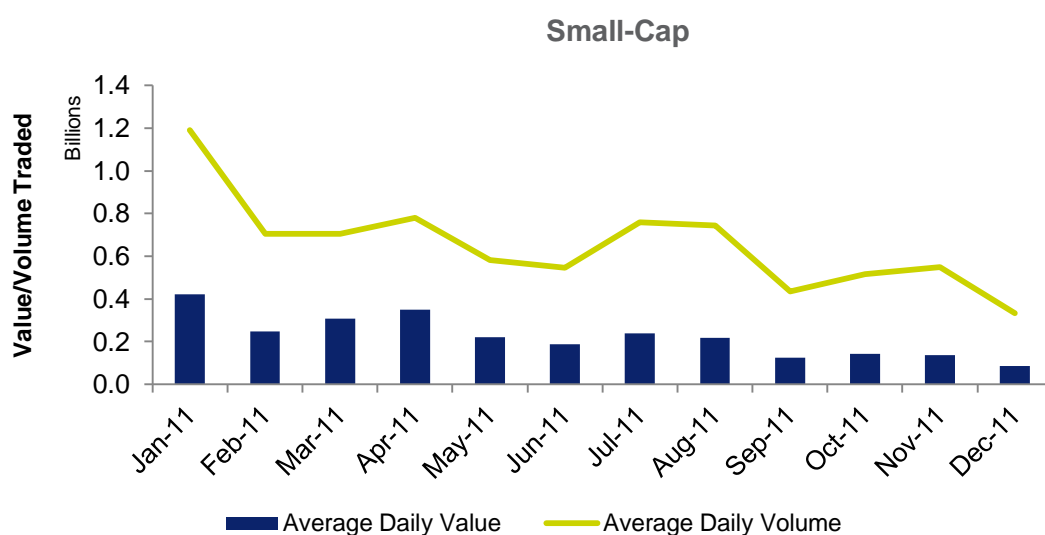
- Trading activity peaked in August 2011 with over \$1.9 billion of daily traded value and over 1.5 billion shares traded daily before declining markedly, particularly into December 2011.
- This is in line with global macroeconomic uncertainty resulting from S&P's downgrade of US' credit rating in August and fear of debt default in much of Euro-zone in the latter half of 2011.



Source: SGX



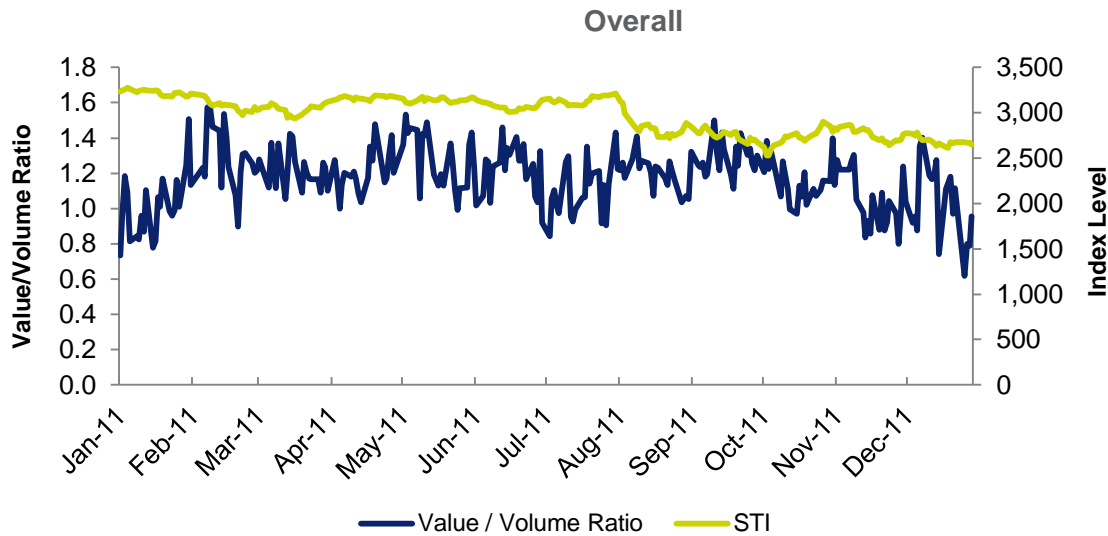
Source: SGX



Source: SGX

- Trading activity of large- and mid-cap stocks increased in the first-half of 2011, peaking in August 2011, in line with the broad market, before declining markedly towards the year-end. Daily average volume and value of mid-cap stocks declined more in percentage terms than for large-cap stocks. Small-cap stocks showed a general decline in activity throughout 2011 i.e. they did not experience the August 2011 peak seen in trading of large- and mid-cap stocks. The declines in the activity of small-cap stocks were significantly steeper than for mid- and large-cap stocks.
- Daily average volume and value of large-cap stocks ended 2011 38% and 44% lower respectively. The fall in daily average volume and value for mid-cap stocks over the same period was 39% and 59% respectively. The decline in daily average volume and value for small-cap stocks was 72% and 80% respectively.
- Comparing the above graphs, we can see that there is more volatility in small-cap stocks as compared to the large and mid-caps.

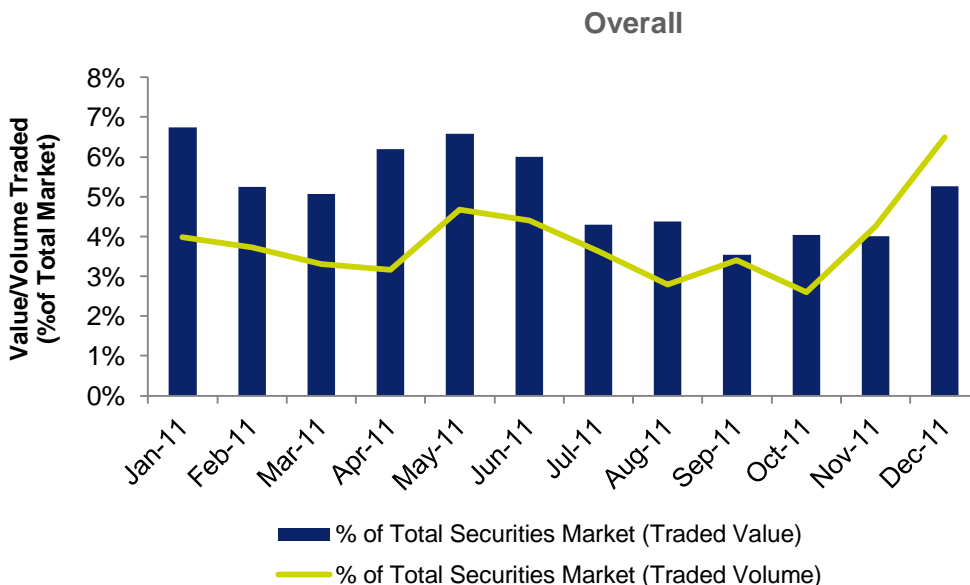
1.2. Value/Volume Ratio and STI



Source: SGX, Bloomberg

- The traded value to traded volume ratio provides an indication of the average price of stocks traded on the market. There was an increase in value over most of the year. However, the December month experienced a subsequent decline in Value/Volume ratio. Over the same period the Straits Times Index has declined to below 3,000.

1.3. Proportion of Married Trades

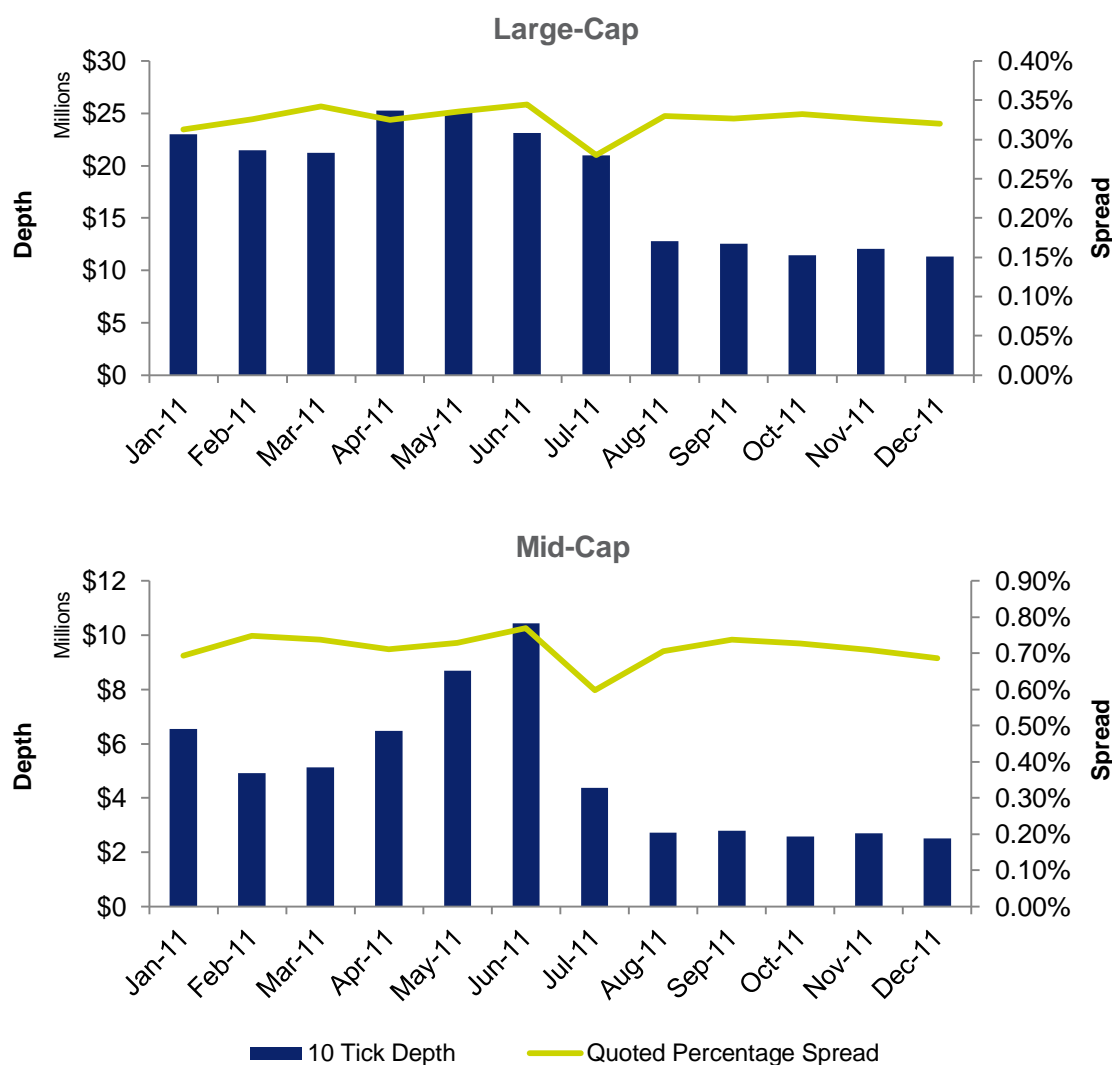


Source: SGX

- The proportion of married trades fluctuated throughout the year, falling in August 2011 to October 2011 before rising towards the year-end. As married trades are normally carried out by institutions, this chart is an indicator of institutional activity though institutional activity also can occur in the open market.

2. Liquidity

2.1. Quoted Bid-Ask Spread and Depth



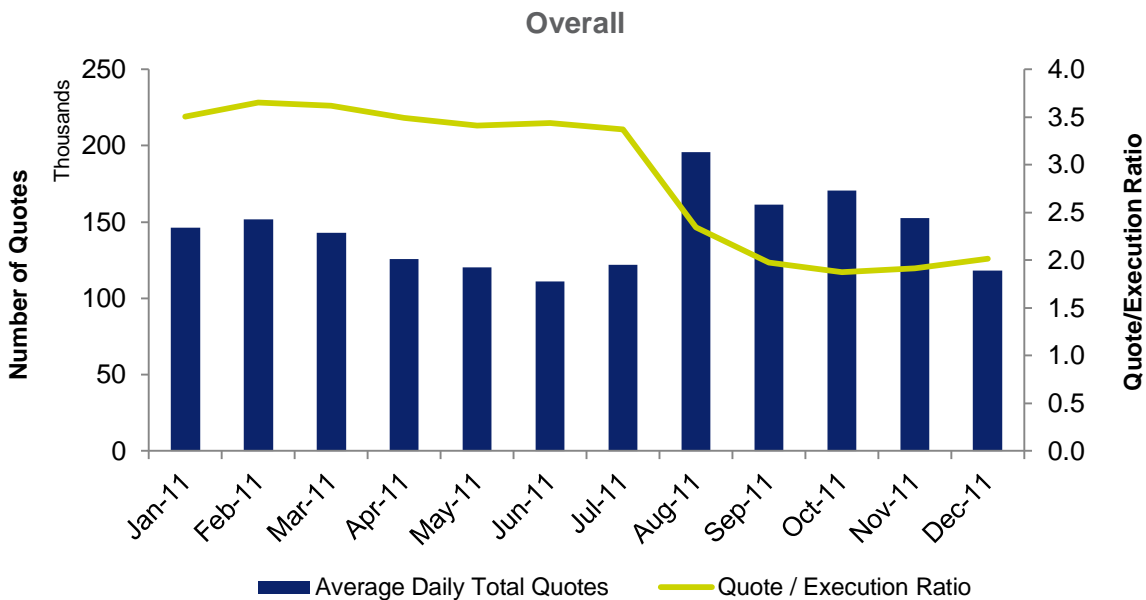
Source: Reuters

Note: Singapore Exchange (SGX) reduced minimum bid sizes for certain categories of securities on 4 July 2011. These changes had the impact of reducing the level of depth available at '10 ticks'. The following table provides the details of the changes to the minimum bid sizes.

Price Range (\$)	Existing		New	
	Bid Size (\$)	10 Ticks as % of Price	Bid Size (\$)	10 Ticks as % of Price
Below 0.20	0.005	≥ 25%	0.001	≥ 5%
0.2 - 0.995	0.005	5% ≤ 25%	0.005	5% ≤ 25%
1.00 - 1.99	0.01	5% ≤ 10%	0.005	2.5% ≤ 5%
2.00 - 9.99	0.01	1% ≤ 5%	0.01	1% ≤ 5%
10 and above	0.02	≤ 2%	0.01	≤ 1%

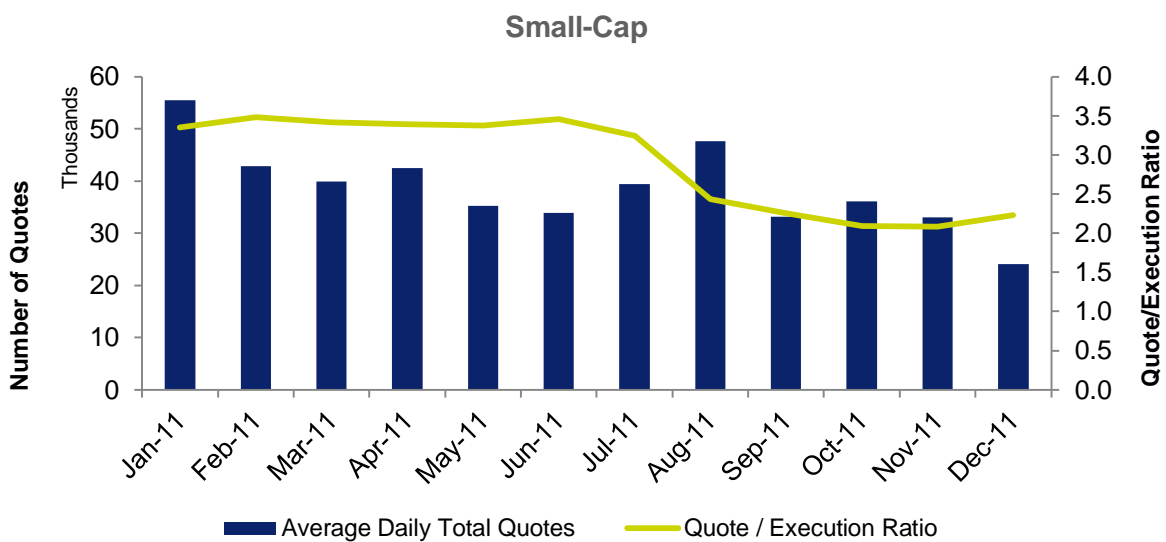
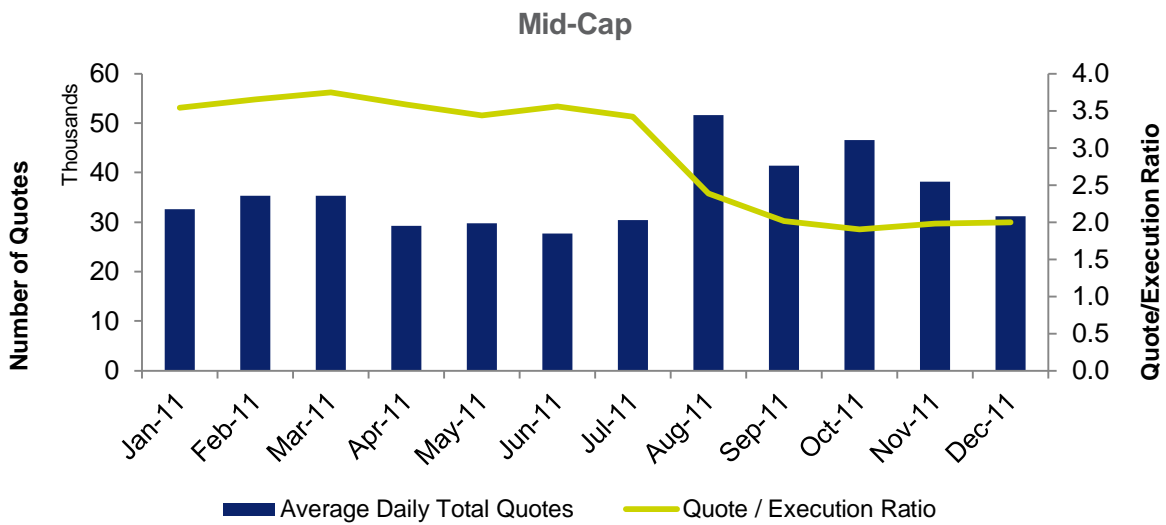
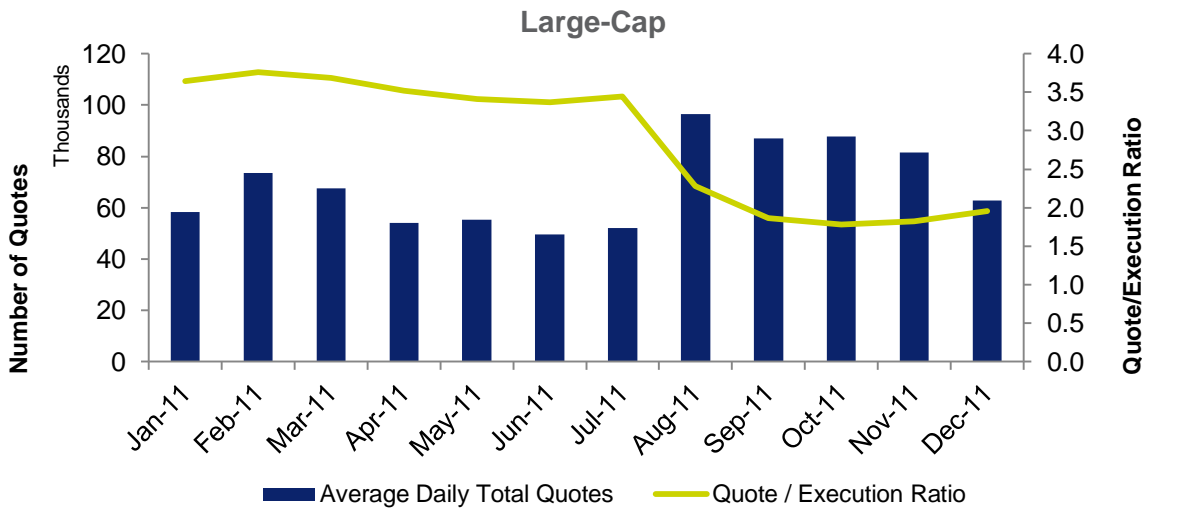
- For Large-Cap stocks, market depth was fairly stable in the first half of 2011 but declined markedly in August 2011 – amid increased market uncertainties - and remained at these lower levels for the rest of the year.
- For Mid-Cap stocks, market depth increased consistently from February 2011 until June 2011, subsequently declining until December 2011. The decline in 10-tick market depth for large-cap stocks was about 50% over the year. Mid-cap stocks experienced a steeper decline in 10-tick market depth which fell two thirds from January 2011 to December 2011.

2.2. Average Daily Total Quotes and Quote to Execution Ratio



Source: Reuters

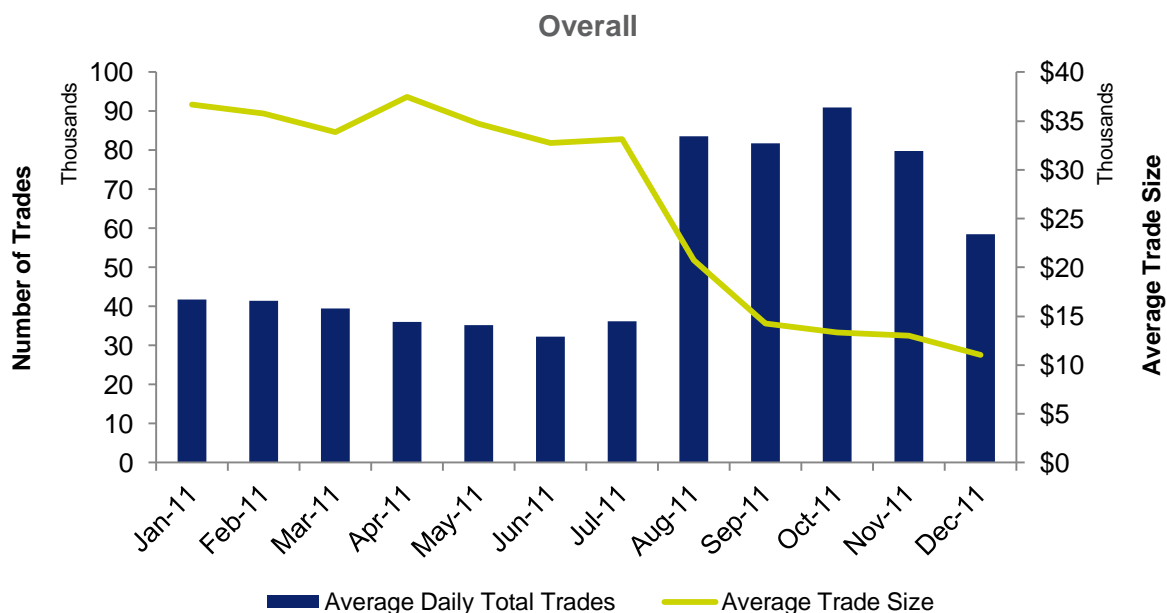
- Average total daily quotes varied throughout the year, peaking in August 2011 at 196,000 quotes before falling to 118,000 quotes in December 2011, a 19% decline from January 2011. The increase in quoting activity in August 2011 is a likely result of the introduction of the Reach trading system on the SGX. Furthermore, the Quote/Execution ratio decreased substantially since the peak in quoting activity in August 2011, implying a reduction in average trade size.
- In general, Quote/Execution Ratio is far lower compared with that of other global exchanges where high-frequency trading accounts for a substantial proportion of market activity.



Source: Reuters

- All three categories of stocks exhibit variance in the average daily total quotes posted. However, both Large-Cap and Mid-Cap stocks ended the period with very much the same number of quotes being posted as the start, while Small-Cap stocks ended the period with a significantly lower number of quotes posted. The Quote/Execution ratio remained steady from January 2011 to July 2011 before experiencing a reduction across all three size categories.
- Large-Cap daily average total number of quotes increased 8% from 58,000 in January 2011 to 63,000 in December 2011.
- Mid-Cap daily average total number of quotes decreased 4% from 33,000 in January 2011 to 31,000 in December 2011.
- Small-Cap daily average total number of quotes decreased 57% from 55,000 in January 2011 to 24,000 in December 2011.
- In general, small-cap stocks experience far steeper declines in trading interest when markets are bearish. Large and mid-cap stocks, on the other hand, are better able to withstand a negative market environment.

2.3. Number of Trades and Average Trade Size

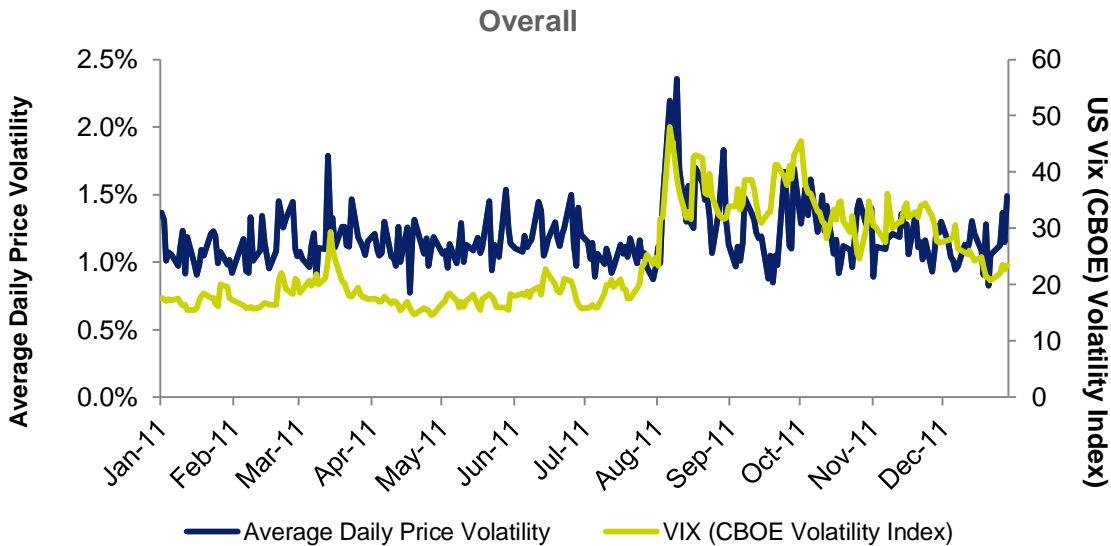


Source: Reuters

- The chart above shows a drop in average trade size from \$33,132 in July 2011 to \$20,745 in August 2011, coinciding with the introduction of Reach. The reduction in average trade size is also coupled with an increase in the number of average daily total trades, increasing from 36,000 trades in July 2011 to 84,000 in August 2011.

3. Volatility

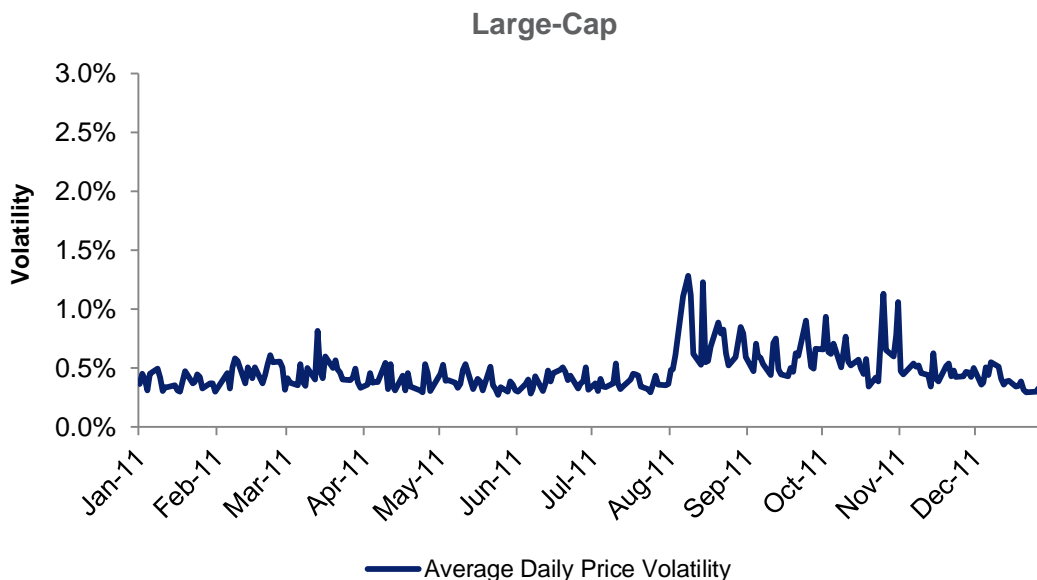
3.1. Daily Average Price Volatility

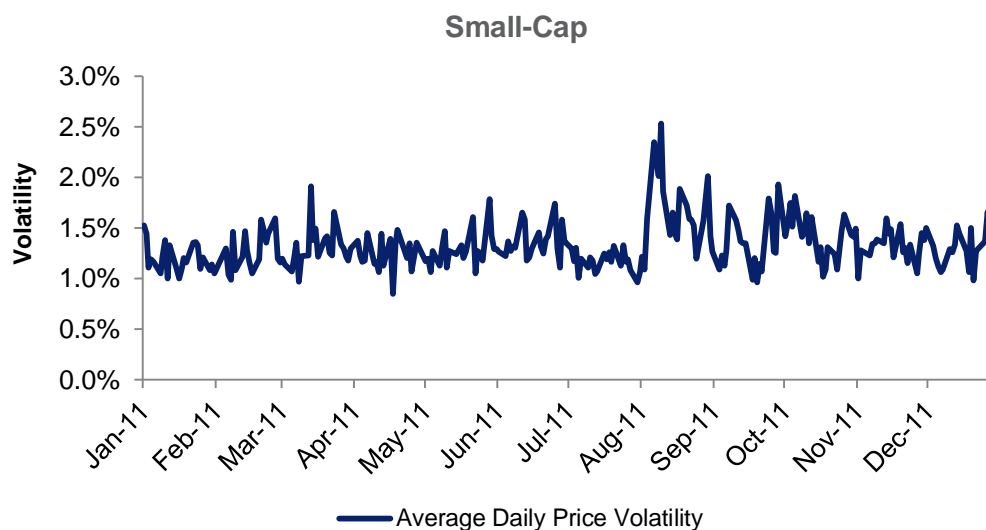
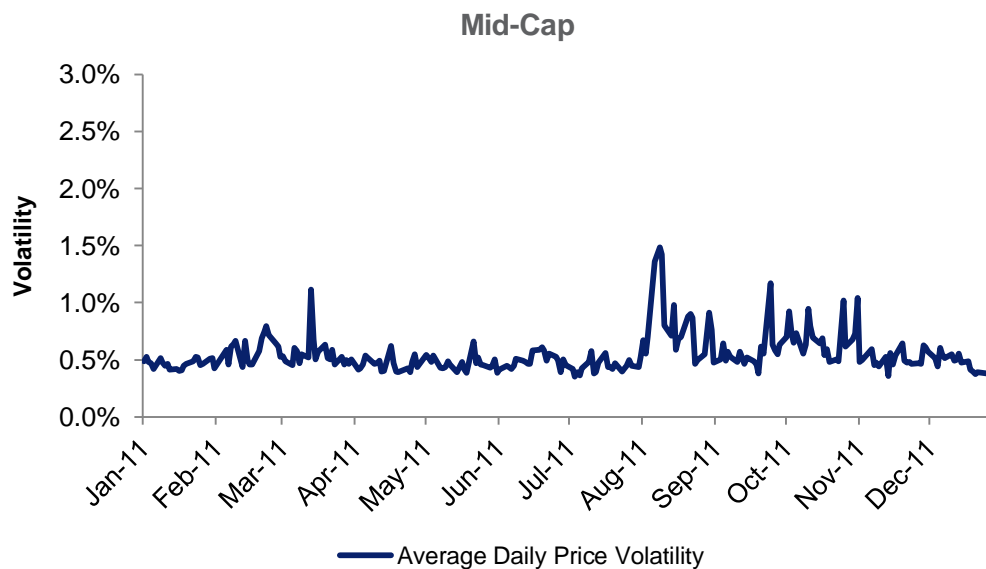


Source: Reuters

Note: Volatility is calculated across all stocks and is not weighted according to market capitalisation or value traded.

Daily average price volatility in the overall market was relatively stable until August 2011 when a spike occurred before easing off to more normal levels by October 2011. Movements in the daily average price volatility were largely in line with the VIX in the US throughout the year. As mentioned earlier, August was a month of many global uncertainties, largely triggered by the US credit rating downgrade by S&P.

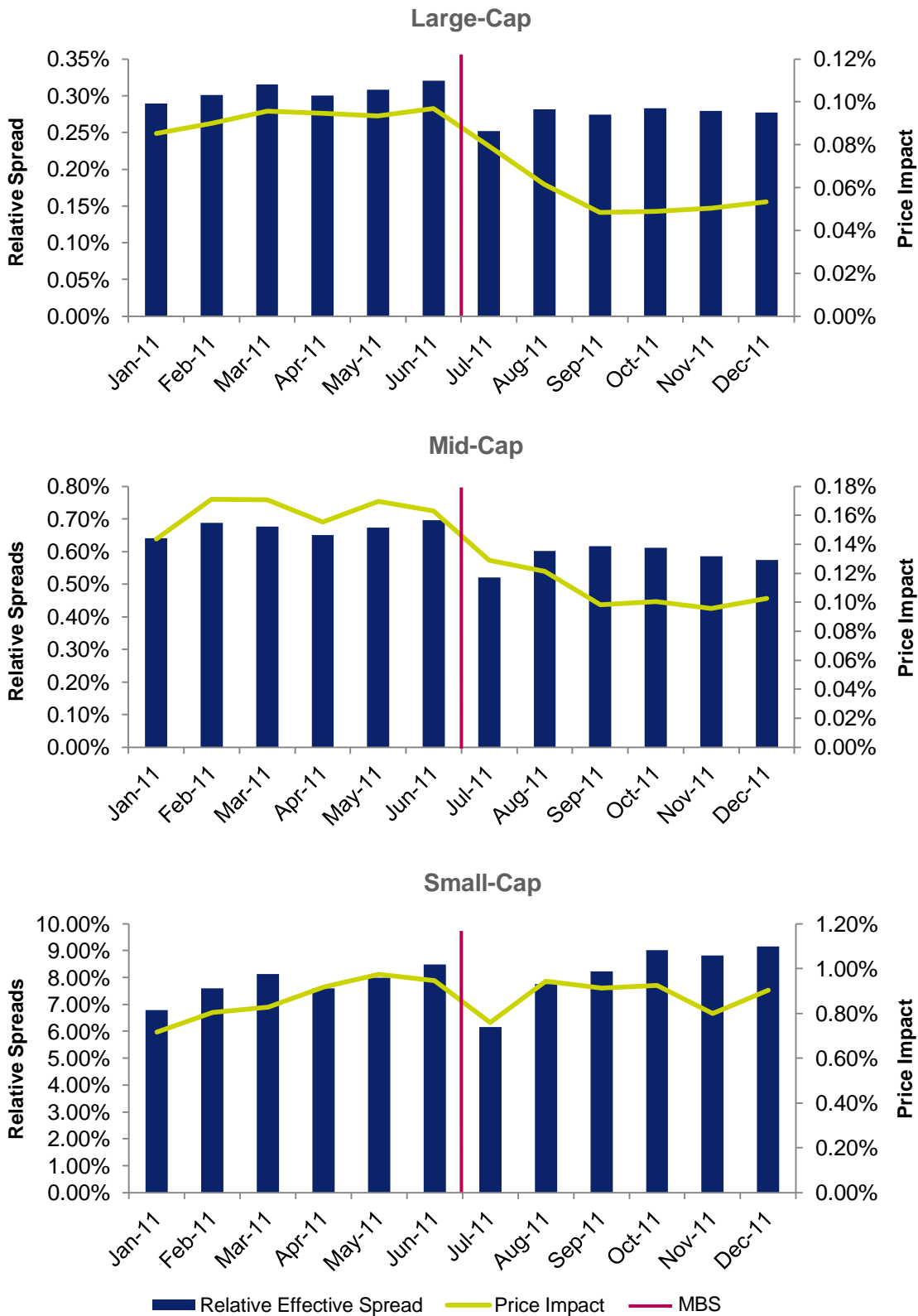




Source: Reuters

- In line with the broad market, daily average price volatility remained stable for all three categories of stocks in the first half of the year before a significant spike in August 2011. Price volatility stabilized across all three categories from early November 2011.
- Large- and mid-cap stocks showed similar levels of price volatility through the peaks and troughs of 2011 though in August 2011, mid-cap stocks were significantly more volatile than large-cap stocks. By the year-end, volatility of large- and mid-cap stocks had reverted to levels observed at the start of the year.
- Small-cap stocks displayed far higher volatility throughout the year and volatility for these stocks remained higher at the year-end than at the start of the year.

4. Trading costs



Source: Reuters

- For Large-Cap stocks, price impact costs remained relatively stable around 9 basis points until June 2011, at which point they started a steady decline to 5 basis points in December 2011. Relative effective spreads (a measure of the cost of demanding liquidity) also remained steady between 29 and 32 basis points before declining to 25 basis points in July 2011 and stabilizing at 28 basis points in December 2011.
- For Mid-Cap stocks, price impact costs also remained relatively stable around 16 basis points up until June 2011. Since July 2011, price impact costs steadily declined to 10 basis points by the end of the period. Relative effective spreads steadily increased from 64 to 70 basis points by June 2011 before declining down to 52 basis points in July 2011 and stabilizing at 57 basis points in December 2011.
- For Small-Cap stocks, price impact costs increased from January 2011, rising 23 basis points to 95 basis points in June 2011. In July 2011, price impact costs declined to 76 basis points before rising back up to 90 basis points in December 2011. Similarly, relative effective spreads also increased from 6.8% to 8.5% during the January 2011 to June 2011 period before a temporary decline to 6.2% in July 2011 and subsequent increase back to 9.2% in December 2011.
- The decline in trading costs for large and mid-cap stocks after June 2011 is a likely result of market liquidity enhancing initiatives such as the changes to MBS in July 2011.

Definitions

10 Tick Depth: is the total depth posted at quotes within +/- 10 ticks from the standing midpoint at any one point in time. It is an indication of the depth available if a trader wants to trade within 10 ticks of the current indicative price. For a monthly figure we take the mean of the average 10 tick depth for each listed stock in the category during the month.

$$10 \text{ Tick Depth } (\$) = \sum_{i=[\text{midpoint} - (10 \times \text{tick size})]}^{n=[\text{midpoint} + (10 \times \text{tick size})]} (\text{Quoted Depth } (\$)_i)$$

Average Daily Total Quotes: is the Total Monthly Quotes across all stocks in that category divided by the number of trading days in the month.

Average Daily Total Trades: is the Total Monthly Number of Trades across all stocks in that category divided by the number of trading days in the month.

Average Daily Traded Value: is the Total Monthly Traded Value across all stocks in that category divided by the number of trading days in the month.

Average Daily Traded Value Per Stock: is the 'Average Daily Traded Value' divided by the number of listed stocks in the category during the month.

Average Daily Volume: is the Total Monthly Volume across all stocks in that category divided by the number of trading days in the month.

Average Daily Volume Per Stock: is the 'Average Daily Volume' divided by the number of listed stocks in the category during the month.

Average Trade Size: is the Total Monthly Traded Value divided by the Total Monthly Number of Trades across all stocks in that category.

Daily Average Price Volatility: is the average of the percentage standard deviation in prices for each stock in the category that traded on that particular day.

$$\text{Percentage Standard Deviation in Price } (\%)_{\text{Stock } i, \text{Day } t} =$$

$$\frac{\text{Standard Deviation } (\text{Price}_{\text{Stock } i, \text{Day } t})}{\text{Mean } (\text{Price}_{\text{Stock } i, \text{Day } t})} \times 100$$

$$\text{Daily Average Price Volatility} = \frac{\sum_{i=1}^n \text{Percentage Standard Deviation in Price } (\%)_{\text{Stock } i, \text{Day } t}}{n}$$

n = Number of stocks that traded on day t .

Large-capitalisation stocks: comprise the 30 Straits Times Index (STI) component stocks.

Mid-capitalisation stocks: comprise the 50 Straits Times Mid Cap Index component stocks.

Price Impact: is the mean of the average daily price impact cost for each stock that traded in the category during the month.

$$Price\ Impact\ (\%)_t = \log\left(\frac{Price_t}{Price_{t-1}}\right)$$

Proportion of Married Trades: refers to the proportion of total traded value and volume that are 'married trades'¹.

Quote/Execution Ratio: is the Total Monthly Quotes divided by the Total Monthly Trades across all stocks in that category.

Quoted Percentage Spread: is the quoted spread as a percentage of the standing midpoint at any one point in time. For a monthly figure we take the mean of the average quoted percentage spread for each stock in the category during the month.

$$Quoted\ Percentage\ Spread\ (\%) = \frac{(Best\ Ask - Best\ Bid)}{Standing\ Midpoint} \times 100$$

Relative Effective Spread: is the mean of the average relative effective spread for each stock that traded in the category during the month. It is a measure of the cost of demanding liquidity.

$$Relative\ Effective\ Spread_t = 200 \times D^* \frac{(Price_t - Midpoint_t)}{Midpoint_t}$$

D is the direction of the trade. A value of 1 for a buyer initiated trade, and a value of -1 for a seller initiated trade.

Small-capitalisation stocks: comprise all remaining SGX-listed stocks after excluding the mid-capitalisation and large capitalisation stocks.

Value/Volume Ratio: is the Total Daily Traded Value over the Total Daily Volume across all stocks in that category.

¹ For more information regarding Direct Business trades or 'married trades' please refer to the SGX Rulebook (<http://rulebook.sgx.com/>).

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