2015

Market Microstructure and Abnormal Returns: An Analysis of NYSE and SGX Securities

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Honors Thesis

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Colby College

May 2015

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Abstract

This paper investigates the differences in the abnormal returns of securities in the context of the earnings announcement in both the United States (NYSE) and Singapore (SGX) markets[1]. Despite the similarities between both exchanges, there exist two key market microstructure differences: the free float factor (i.e. the portion of listed share capital that is freely traded on the market) and lot size (i.e. the minimum number of shares that an investor can trade in a single transaction). While the difference in the lot size can be attributed to the intrinsic institutional differences between both exchanges, the involvement of the sovereign wealth fund and other concentrated strategic investors might be the underlying reason for the comparatively lower free float characteristic of SGX-listed securities. Using a dataset obtained from a Bloomberg Terminal over a 10-year period, the abnormal returns during a two-day earnings announcement window will be examined for securities listed in both exchanges. The results suggest that market microstructure differences have an effect on the liquidity and abnormal returns of securities during the announcement period.

[1] The motivation for the comparison between the Singapore Stock Exchange (SGX) and New York Stock Exchange (NYSE) was born from my internship with the SGX, as it was the internal view for the exchange to strive towards becoming the New York Stock Exchange (NYSE) or London Stock Exchange (LSE) of Asia.

ACKNOWLEDGEMENT

I would like to thank my research supervisor, Professor Michael Donihue, without whom this paper would have never been accomplished. Thank you very much for your support and understanding during this entire academic year.

I would also like to show gratitude to Professor Leonard Wolk, whom had kindly assisted me with the statistical analysis of my honors thesis and was also very patient with my knowledge gaps in the area of market microstructure. I would also like to thank Professor Linwood Downs for agreeing to be my second reader, as well as for helping me brainstorm for a feasible research topic.

Finally, I would like to thank Dr. Murphy Lee, who is a close friend, colleague, and supervisor during my internship with the Singapore Stock Exchange. The opportunity to work and learn from you has been an extraordinary experience, and I hope that I have managed to address some of the points that were surfaced in the early versions of our discussions.

I. INTRODUCTION

Informed traders have been using strategies centered on earnings announcements, and by examining post-earning announcement drifts, it has been found that securities do exhibit higher returns during earnings announcement months than during non-announcement months (Barber, De George, Lehavy & Trueman 2013). The earnings announcement premium was also examined around the globe, and their study documented a difference in the magnitude of the returns across both the US and Singapore markets. Can this difference in the earnings announcement premium be explained by the intrinsic difference in the market microstructure between both markets? Instead of examining the returns associated with the post-earning announcement drifts, this paper will focus on the abnormal returns associated with the immediate two days before and after an earnings announcement, and a comparison of these abnormal returns between the securities listed in the New York Stock Exchange (NYSE) and Singapore Stock Exchange (SGX) will be examined.

The underlying motivation for the comparison of both markets is due to the intrinsic differences in the market microstructures, namely the free float factor and the lot size, both of which can serve as an adequate measure of a security's liquidity. Free float can be defined as the portion of listed share capital that is freely traded on the market, i.e. the total number of outstanding shares net of any restricted shares that are held by company management, the government, or other insiders for long-term or strategic reasons (Wang & Xu 2007). Free float has surfaced as an important factor during recent years, as many investment banks are beginning to use it as a proxy for a security's liquidity and attractiveness as an investment (Chan, Chan & Fong 2004). Accordingly, securities with lower free float might be subjected to greater volatility and lower liquidity as there are fewer shares available for purchase or sale in the event of any significant news (Caliskan & Keresteciogl u 2013). NYSE-listed securities have one distinct feature, amongst many others, that differs from those securities listed on SGX: NYSE-listed securities tend to have a much higher free float. In the case of SGX, the lower free float

characteristic may be due to the participation of the sovereign wealth fund, Temasek Holdings, which often takes a large ownership stake (>20%) in SGX-listed companies (Demange 2009). According to Demange (2009), Temasek is the holding company for the Republic of Singapore that brings together all the state interests in Singaporean government linked companies (GLCs) that are typically considered blue-chip stocks: Singapore Airlines, Keppel Corporation, SembCorp Industries, Singapore Technologies Engineering, Capitaland, Mediacorp, Singtel, Starhub, DBS Group Holdings among others. This ownership of securities does not account for other strategic shareholders whom may also be locking up a sizeable portion of the available listed market capitalization.

Apart from the free float factor, the lot size might also provide another perspective into the measure of liquidity due to the underlying differences in market microstructure. The lot size can be defined as the minimum number of shares that an investor can trade in a single transaction[2]. Prior to January 2015, SGX-listed securities were traded in lots of 1,000 units; NYSE-listed securities however, were and are traded in lots of 100 units. Both markets however, allow for the trading of odd-lots in the odd-lot market, albeit at a discount to their relative market values. According to Moulton (2005), a simple definition of liquidity is how easily a transaction can be executed, and that the ease of trading the desired quantity of securities – a multiple of the lot size – is one of the determinants of liquidity. Intuitively then, it is not difficult to see that NYSE-listed securities should exhibit higher liquidity compared to their SGX-listed counterparts due to this intrinsic institutional microstructure difference.

The rest of the paper proceeds as follows: Section II reviews the relevant literature, Section III describes the data and the proposed model, Section IV discusses the results of this research topic, and Section V discusses the possible future directions of this research.

[2] http://www.investopedia.com/terms/l/lot.asp

II. LITERATURE REVIEW

Earlier studies have concluded that earnings announcements tend to attract the attention of investors who are likely to be influenced by behavioral biases, since earnings announcements are very visible (Kaniel, Liu, Saar & Titman 2012). However, most research had focused on the anomaly of the post-earnings announcement drift, which is a function of the magnitude of an earnings surprise (Cao & Narayanamoorthy 2012). Accordingly, these returns are abnormally high in the months following good earnings announcement surprises, and abnormally low in the months following bad earnings announcement surprises (Kaniel, Liu, Saar & Titman 2012).

Since the free float factor is the first dimension of the underlying market microstructure differences between both markets, there is a need to examine the impact of these abnormal returns after controlling for the free float factor. Caliskan and Keresteciogl u (2013) found that for securities that are listed on the Istanbul Stock Exchange, the free float factor is not a statistically significant predictor of price return. However, the employed methodology did not control for other factors such as the firm's market capitalization, or trading volume which are controlled for in other comparable research (Alexander, Peterson & Beardsley 2014; Truong & Corrado 2014). Furthermore, their research was not conducted in the context of the abnormal returns during earnings announcement.

Chan, Chan, and Fong (2004) also studied the impact of the Hong Kong government's intervention in 1998, where the government claimed that the goal of the intervention was to drive currency speculators out of the financial markets. This undoubtedly reduced the free float of the Hang Seng Index component securities (33 companies) that were purchased by the government. Their findings concluded that there was an increase in the price effects of trade for those securities, which indicated that those securities experienced a reduced ability to absorb temporary order imbalances after the intervention of the Hong Kong government. The study concluded that the strategic involvement of key

shareholders (i.e. sovereign wealth funds and other strategic shareholders etc.) should be discouraged, as concentrated ownership structures appear to reduce overall market liquidity. Given that liquid markets should intuitively be associated with lower abnormal returns, the corollary that follows is that higher free float securities (i.e. more liquid securities) should be associated with lower abnormal returns, and vice versa. This is the free float hypothesis that provides the underlying foundation of this research in the context of abnormal returns around earnings announcements.

The second dimension of market microstructure differences is the minimum lot size. Ahn, Cai, Hamao and Melvin (2014) hypothesized that lot size was important because it determines the minimum investment needed for trading, which can influence the trading activity of small retail investors. As their study of the Tokyo Stock Exchange correctly pointed out, a reduction in lot size was indeed associated with an influx of small investors, as well as an improvement in liquidity. The improvement in liquidity can be measured by the increase in the volume of trades per day, which doubled after the reduction in the lot size. Intuitively then, smaller lot sizes can be associated with greater liquidity measured as a change in the trading volume. Consequently, the greater trading volume, a feature of a liquid market, should be associated with smaller abnormal returns. This logic forms the core of the volume change hypothesis, albeit in the context of a lot size reduction. It should remain relevant even when extended to the context of abnormal returns around earnings announcements.

Given the disconnect between studies on earnings announcements and free float, and the dearth of studies on how the level of free float is related to stock liquidity (Chan, Chan, & Fong, 2004), the first area to examine is whether low free float securities actually exhibit higher abnormal returns in the context of earnings announcements. Secondly, the intrinsic difference in the minimum lot size in both exchanges allows for the examination of a second issue: whether trading volume changes around earnings announcements is associated with abnormal returns in the context of the earnings announcements.

III. DATA AND PROPOSED MODEL

To proceed with this analysis, a sample of 1,001 NYSE-listed stocks and 130 SGX-listed stocks was selected from the Bloomberg database[3]. To be included in the sample, stocks must be listed over a 10-year period from 1st January 2004 to 31st December 2013, have exhibited 10 years' worth of quarterly earnings announcements (40 earnings announcement dates), and have been continually listed over this period. Given approximately 2,800 NYSE-listed stocks and a total of 770 SGX-listed stocks, the sample represents approximately 36% and 17% of the total number of listings in the respective exchanges. Subsequently, each sample was grouped according to their Global Industry Classification Standard (GICS) sectors. *Table 1* presents the industry classification of each sample:

Table 1: Industry Classification of Each 10-Year Market Sample

Industry	No. of NYSE Companies	% of NYSE Companies	No. of SGX Companies	% of SGX Companies
Consumer Discretionary	161	16.08%	22	16.92%
Consumer Staples	50	5.00%	11	8.46%
Energy	102	10.19%	2	1.54%
Financials	231	23.08%	30	23.08%
Health Care	70	6.99%	3	2.31%
Industrials	171	17.08%	30	23.08%
Information Technology	57	5.69%	22	16.92%
Materials	86	8.59%	7	5.38%
Telecommunication Services	6	0.60%	2	1.54%
Utilities	67	6.69%	1	0.77%
Total:	1,001	100%	130	100%

From *Table 1*, the Financials, Industrials, and Consumer Discretionary industries make up the three largest segments of each sample, representing 56% of the NYSE market sample, and 63% of the SGX market sample respectively. Similarly, the Telecommunication Services industry makes up the

[3] Bloomberg L.P. (2014) *Historical Free Float, Market Cap, Price, Trading Volume, Listing Venues, and GICS Industry Codes for selected NYSE and SGX-listed securities 1st January 2003 – 31st December 2013.* Retrieved August 2014 from Bloomberg Terminal.

smallest industry in each sample, representing 0.60% in the NYSE market sample, and 1.54% in the SGX market sample. Given the similarity of the sector compositions in both markets, it may also be appropriate to examine the similarities/differences in the abnormal returns across each aggregated market.

As discussed in the introduction, free float has surfaced as an important factor during recent years, as many investment banks are beginning to use it as a proxy for a stock's liquidity and attractiveness as an investment (Chan, Chan & Fong 2004). Consistent with most research, market capitalization is used to control for firm size. Similarly, the volume measure that captures trading activity can be attributed to any informed trading activity that might be attributing to any abnormal returns around earnings announcements (Truong & Corrado 2014).

Table 2 below presents the descriptive statistics of both market samples, for each of the variables discussed:

Table 2: Summary Statistics of Each 10-Year Market Sample

	NYSE		**SGX**	
	Average	**Median**	**Average**	**Median**
Price (USD)	117	22	1.05	0.41
Market Cap (USD million)	7,811	1,554	957	204
Free Float (%)[4]	87	95	54	50
Volume (# of shares)	1,023,490	240,500	8,254,392	790,850

[4] Intuitively, free float is expected to be within the range of 0-100%. In reality however, free float can exceed 100% due to short interest activity. For example, if a company is 100% owned by investor *A*, *A* can lend out 20% of the owned shares to investor *B*, who then short sells it to investor *C*. Both investors *A* and *C* can claim ownership rights to these shares, and hence a free float of 120% can be reported. For simplicity, stocks with free floats that exceed 100% are excluded from the dataset.

Table 3: Definition of Variables

Variable	**Definition**	**Abbreviation**
Time	Day –2 to day +2 relative to earnings announcement date	t
Free Float Rate	Daily percentage of market capitalization that is available for sale	–
Average Free Float	Average percentage of free float for firm *i* over time *t*	$FreeFloat_{ti}$
Market Capitalization	Daily share price times the number of shares outstanding at the end of day for firm *i* over time *t* (denominated in USD to control for exchange rate fluctuations)	$MktCap_{ti}$
Price	Daily closing price of the associated security (denominated in USD to control for exchange rate fluctuations)	Price
Abnormal Returns	Abnormal price returns for firm *i* over time *t*	AR_{ti}
Volume	Daily total number of shares or contracts traded in a security	–
Average Volume	Average trading volume for firm *i* over time *t*	$Volume_{ti}$
Volume Change	Percentage change in trading volume for firm *i* over time *t*	$VolChg_{ti}$
Q1	First quarter indicator variable taking on values of 1 or 0 for firm *i* over time *t*	$Q1_t$
Q2	Second quarter indicator variable taking on values of 1 or 0 for firm *i* over time *t*	$Q2_t$
Q3	Third quarter indicator variable taking on values of 1 or 0 for firm *i* over time *t*	$Q3_t$

Given that the NYSE is the world's largest stock exchange by market capitalization, it should not be surprising that the average and median price and market capitalization of NYSE-listed securities are higher than the securities that are listed on the SGX. Similarly, the larger average and median trading volume of SGX-listed securities is likely driven by the lower average security price, the higher lot size, or both. Consistent across both markets however, *Price*, *Market Cap*, and *Volume* have a median that is much smaller than the average. This appears to suggest that there might be a subsample, within each market sample, that has a higher value for each of the above three variables that is causing this disparity[5]. The same cannot be said about *Free Float*, as the median is smaller than the average in the Singapore market, while the converse is true in the US market. Thus, the information in *Table 2* further confirms the distinct feature of both markets that was discussed in the introduction: SGX-listed stocks tend to have lower free float.

A quick examination of the kernel density plots, which estimates the probability density function of a continuous variable, showed that free float also follows a distinctly different distribution. The stark difference in the distribution of the free float factor, which is not observed for trading volume and market capitalization, confirms that free float may be a significant indicator of the underlying market microstructure differences in both markets. Therefore, understanding the impact of free float may provide insights into the significance of abnormal returns around earnings announcement.

[5] Consider the following set of numbers: 10, 20, 30, 30, 40, 50, 70, 1000, and 1000. The sample average is 250 while the median is 40. Clearly, the average is distorted by the subsample consisting of the two counts of 1000, which is contributing to the observed disparity between the two statistics.

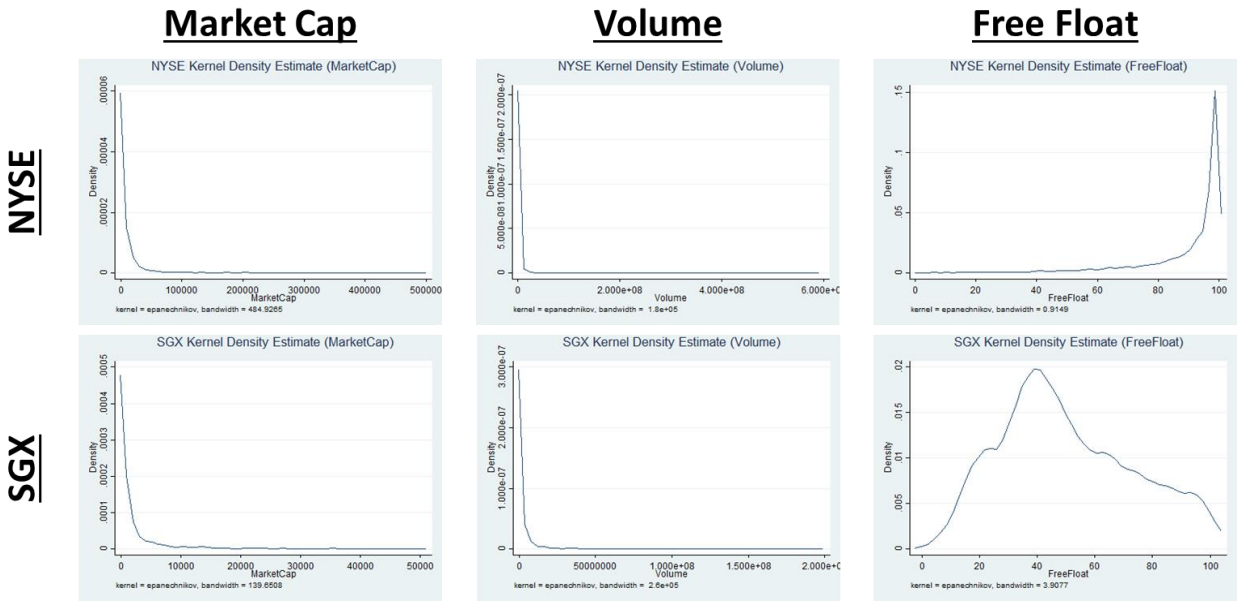

Figure 1: Kernel Distribution Plots of Each 10-Year Market Sample

Consistent with the methodology proposed by Atilgan (2014), the abnormal returns of each firm in the respective sample (AR_{ti}) were computed over the period from *t*–2 to *t*+2 relative to the earnings announcement. AR_{ti} is calculated relative to the comparable index closing price (*Price'*) for the corresponding period; the *S&P 500 Index* is chosen as the comparable index for the NYSE sample, while the *Straits Times Index* is chosen as the comparable index for the SGX sample.

$$AR_{ti} = \frac{\frac{1}{n}\sum_1^2 Price_{t+n} - \frac{1}{n}\sum_1^2 Price_{t-n}}{\frac{1}{n}\sum_1^2 Price_{t-n}} - \frac{\frac{1}{n}\sum_1^2 Price'_{t+n} - \frac{1}{n}\sum_1^2 Price'_{t-n}}{\frac{1}{n}\sum_1^2 Price'_{t-n}}$$

The average free float rate ($FreeFloat_{ti}$), market capitalization in US dollars ($MktCap_{ti}$), and trading volume ($Volume_{ti}$) were also computed over the same time period *t*. Their respective formulas are as follow:

$$Var_{ti} = \frac{\sum_1^2 Var_{t+n} + \sum_1^2 Var_{t-n}}{4}, \text{ where } Var_{ti} \in \{FreeFloat_{ti}, MktCap_{ti}, Volume_{ti}\}$$

Similarly, the percentage change in volume ($VolChg_{ti}$) was computed over the same time period t, and is given as follow:

$$VolChg_{ti} = \frac{\frac{1}{n}\sum_{1}^{2} Vol_{t+n} - \frac{1}{n}\sum_{1}^{2} Vol_{t-n}}{\frac{1}{n}\sum_{1}^{2} Vol_{t-n}}$$

The final model, adapted from the methodology employed by Barber, De George, Lehavy and Trueman (2013) and Truong and Corrado (2014), which compares the abnormal price returns across both the US and Singapore markets, is as follow:

$$AR_{ti} = \beta_{0ti} + \beta_{1ti}\, FreeFloat_{ti} + \beta_{2ti}\, VolChg_{ti} + \beta_{3ti}\, Q1_{t} + \beta_{4ti}\, Q2_{t} + \beta_{5ti}\, Q3_{t} + \varepsilon_{i}$$

$Q1_{ti}$, $Q2_{ti}$, and $Q3_{ti}$ are the quarterly specific indicator variables included to control for the effects of quarterly changes. Each takes on the values of one or zero in their respective samples. Consistent with the findings of Chan, Chan & Fong (2013) whereby an expected smaller price effect[6] is associated within a relatively liquid market, the coefficient of $VolChg_{ti}$ is expected to exhibit negative associations with AR_{ti} around earnings announcements, as any large changes in trading volume should be associated with low abnormal returns. Finally, the coefficient of $FreeFloat_{ti}$ is expected to be negatively related to the magnitude of AR_{ti} around earnings announcements, as securities with lower free float are not as publicly available for trading (Caliskan & Keresteciogl u 2013) even when large abnormal returns are anticipated around earnings announcements.

[6] According to Chan, Chan and Fong (2013), the price effect measures how prices are affected when trades are executed

IV. RESULTS

After examining the entire sample of both markets, the initial regression results in *Table 4* concurred with our initial expectations: free float is negatively associated with abnormal results. However, free float is not a significant predictor of abnormal returns in both markets. On the other hand, volume changes are positively associated with abnormal returns in both markets, and are significant at the 1% level. The insignificance of free float and the reversed direction of the association for volume change might likely have contradicted our expected results because of the failure to account for the market differences in both samples (see *Table 2*).

Table 4: Regression Results of Entire Market Samples

AR_{ti}	**NYSE**	**SGX**
$FreeFloat_{ti}$	-0.000012	-0.0000497
	(-0.44)	(-1.24)
$VolChg_{ti}$	0.0051445***	0.000565***
	(25.62)	(5.88)
$Q1_t$	0.000904	0.0104364***
	(0.75)	(4.04)
$Q2_t$	0.0006209	0.0019548
	(0.51)	(0.76)
$Q3_t$	0.0014098	0.0011195
	(1.17)	(0.43)
Constant	-0.0012463	-0.0005398
	(-0.48)	(-0.20)
Adj R-squared	0.0162	0.0121
Number of securities	1,001	130

The *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively, and the t-stats are given in parentheses.

Given the underlying differences in market microstructure, a fair comparison may have to utilize datasets that are comparable across both markets. Intuitively, liquidity is important in the context of trading securities as one wants to trade financial assets as close as possible to the market price. Thus, it is important that both samples are controlled for liquidity, which can easily be measured by trading volumes, i.e. securities with higher trading volumes are associated with higher liquidity and vice versa. In

light of the underlying differences in both markets (see *Table 2*), it must be noted that trading volume alone is a flawed measure of a stock's liquidity, especially given the huge discrepancy in each exchange's firm size and security price. In order to control for the differences in size and price effects in both markets, a liquidity measure needs to be computed and be used as a benchmark for each respective market:

$$\text{Liquidity Ratio} = \frac{Volume * Price}{Market\ Capitalization}$$

While this measure of liquidity ratio deviates from more traditional measures of liquidity (i.e. bid-ask spreads, depth of market order book etc.), it provides an adequate measure in the absence of more comprehensive data. Furthermore, the proposed liquidity ratio bears some resemblance to the *Turnover Velocity*[7] measure defined by the World Federation of Exchanges, which is an intuitive measure of a security's liquidity.

By referencing the trading volume, price, and market capitalization of each security on 2nd January 2004, the "first day" liquidity ratio for each security was computed. After computing the liquidity ratio of each firm, their corresponding liquidity ratios were compared to the median liquidity ratio of the entire sample in each market. Subsequently, each market was subdivided, and securities were sorted according to whether they were defined as *High Liquidity* (> sample median) or *Low Liquidity* (< sample median) securities. This subdivision resulted in four possible pair-wise combinations, which may provide insights into the features of each security in their respective markets.

[7] http://www.world-exchanges.org/files/statistics/pdf/Stats_definitions_2013.pdf

Table 5: Pair-Wise Combinations of Market Analysis

Panel	Possible Pair-Wise Combinations	Type of Market Analysis
A	NYSE High Liquidity VS NYSE Low Liquidity	Intra-Market Analysis
B	SGX High Liquidity VS SGX Low Liquidity	Intra-Market Analysis
B	NYSE High Liquidity VS SGX High Liquidity	Cross-Market Analysis
B	NYSE Low Liquidity VS SGX Low Liquidity	Cross-Market Analysis

Interestingly, *Panel B* comprise the NYSE-listed securities that were classified as Low Liquidity, as well as both the High and Low Liquidity SGX-listed securities. For *Panel B*, free float maintained the negative association to abnormal returns although the association was no longer significant, and volume change exhibited a positive association to abnormal returns that was significant at the 1% level.

Table 6: Summary Statistics of Liquidity Sub-Samples In Each Market

	NYSE				**SGX**			
	High Liquidity Sample		**Low Liquidity Sample**		**High Liquidity Sample**		**Low Liquidity Sample**	
	Average	**Median**	**Average**	**Median**	**Average**	**Median**	**Average**	**Median**
Volume (# of shares)	1,523,392	561,500	544,132	88,609	18,733,601	3,322,500	808,639	238,619
Free Float (%)	90	97	83	92	55	50	54	52
# of Securities	490		511		54		76	

Based on this categorization, the regression analysis was conducted again; the results presented in *Table 7* are broadly summarized by the two panels classified in *Table 5*. For *Panel A*, the results concurred with the hypothesis: free float exhibited a negative association with abnormal returns that is significant at the 10% level, and volume change exhibited a negative association with abnormal returns that is significant at the 1% level.

Table 7: Regression Results of Liquidity Sub-Samples in Each Market

AR_{ti}	NYSE		SGX	
	High Liquidity	**Low Liquidity**	**High Liquidity**	**Low Liquidity**
$FreeFloat_{ti}$	-0.0000931*	-0.00000978	-0.0000461	-0.0000414
	(-1.70)	(-0.30)	(-0.57)	(-1.06)
$VolChg_{ti}$	-0.0032627***	0.0073754***	0.000566***	0.0005861***
	(-8.00)	(31.03)	(3.68)	(4.92)
$Q1_{ti}$	0.0020419	0.0005077	0.0094777*	0.0111083***
	(1.27)	(0.29)	(1.88)	(4.27)
$Q2_{ti}$	-0.0000298	0.0013556	-0.0014437	0.0043767*
	(-0.02)	(0.76)	(-0.29)	(1.69)
$Q3_{ti}$	-0.0006569		-0.000957	0.0026055
	(-0.41)	(-0.19)	(2.01)	(1.00)
Constant	0.0136937***	-0.0018237	-0.0043173	-0.0002073
	(2.60)	(-0.33)	(-1.37)	(-0.08)
Adj R-squared	0.0032	0.0085	0.0455	0.0163
Number of securities	490	511	54	76

The *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively, and the t-stats are given in parentheses.

These results suggest that the low liquidity securities listed in the NYSE might perhaps exhibit similar characteristics to SGX stocks (both high and low liquidity – *Panel B*). From the free float perspective, the low liquidity NYSE sub-sample indeed exhibits a lower average and median free float compared to the high liquidity sample, and this trend was observed in the SGX sub-samples as well (*Table 6*). From this, it may be plausible to infer that a lower free float might indeed be one predictor (amongst many others) of abnormal returns derived from earnings announcements, although this may be limited to securities that bear resemblance to the "blue chip" NYSE-listed securities that exhibit high liquidity (i.e. the predictor is only statistically significant for the securities in *Panel A*). From the perspective of volume change, the positive association may indicate that there is greater market inefficiency associated with SGX-listed securities even after controlling for liquidity, as large changes in trading volume were still associated with large abnormal returns around earnings announcements. Supporting this interpretation, *Table 6* shows that the low liquidity sub-samples also exhibited a lower

average and median volume change compared to the high liquidity sub-samples in both markets. It could be hypothesized that the low liquidity NYSE sub-sample was a more illiquid and inefficient segment of the entire NYSE market, as large changes in the trading volume of such stocks are associated with large abnormal returns around earnings announcements as well. This conclusion could likely be extended to both the SGX liquidity sub-samples as well.

Consistent with the kernel distribution plots of the original market samples, the kernel distribution plots of each market sub-sample (*Figure 2* and *Figure 3*) show that the distribution characteristics of each sub-sample do not deviate significantly from those in the original samples. This confirms that the regression results are robust, and that any conclusions inferred from the regression analyses remain valid even when extended to the respective market sub-samples.

V. DISCUSSIONS

Given that the primary function of a marketplace is to provide liquidity to market participants (Cumming, Johan & Li 2011), SGX had recently implemented market reforms to rectify the liquidity issue addressed by the changes in trading volume around earnings announcements: SGX implemented the Market-Maker and Liquidity-Provider schemes[8] in June 2014; and reduced the lot size[9] from 1,000 to 100 in January 2015.

While steps taken to rectify the liquidity issues are in the right direction, it may be of value for SGX, as well as other stock exchanges, to also consider the mandate for a higher minimum free-float as

[8] SGX introduced the Market-Maker and Liquidity-Provider schemes to increase trading liquidity for the benefit of all investors.
http://www.marketwatch.com/story/singapore-exchange-sgx-to-revise-fees-for-securities-market-2014-02-07

[9] SGX reduced the lot size from 1,000 to 100 units per lot to make higher-priced blue-chip stocks more accessible for retail investors by reducing the amount of capital outlay.
http://www.straitstimes.com/news/business/more-business-stories/story/new-sgx-trading-rules-what-you-need-know-20140831

an initial or ongoing listing requirement[10] because the market generally rewards securities with higher free float: average daily closing price and trading activity were significantly higher (Bostancı & Kılıç, 2010). This recommendation is consistent with the conclusions of Caliskan & Keresteciogl (2013), whereby lower free float might possibly be the cause of inadequate liquidity in the security. Higher minimum free float as an initial or ongoing listing requirement may provide the potential for exchange-listed securities to "mimic" the characteristics of the high-liquidity NYSE-listed securities (*Panel A*), which may then reduce the abnormal returns associated with earnings announcements, which improves overall market liquidity.

Finally, given that the abovementioned market reforms conducted by the SGX were implemented after the 2013 calendar year (which falls outside the period of the data set), it may be beneficial for future research to evaluate the effectiveness of the market reforms through a pre-and-post market reform analysis. Doing so could determine whether the characteristics of SGX-listed securities eventually converge towards the characteristics of the high-liquidity NYSE sub-sample if the market's overall liquidity improves.

[10] A comprehensive study conducted by Freshfields Bruckhaus Deringer LLP, a multinational law firm headquartered in London, compared the IPO listing requirements across different exchanges, and found that NYSE and NASDAQ do not have a minimum free float listing requirement. On the other hand, SGX has a minimum free float ranging from 12%-25% to be eligible for mainboard listing. This study can be found at the following website: http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/IPO/35368%20IPO%20listing%20requirementsSpread.PDF

Figure 2: Kernel Distribution Plots of Each NYSE Sub-Sample

Figure 3: Kernel Distribution Plots of Each SGX Sub-Sample

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