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Liquidity Using Corwin and Schultz Approach and Stock Returns in the Indonesian Capital Market

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ABSTRACT

This paper examines the relationship between bid–ask spread approach proposed by Corwin and Schultz to measure illiquidity and its impact on excess stock returns in the Indonesian stock exchange using extended Fama and French models. The sample of the study is daily stock prices in the KOMPAS 100 Index covering the first quarter of 2013 up to second quarter 2016. Data regression analysis suggests that a stock's illiquidity is not a price factor in the Indonesian market even after controlling three factors from Fama and French. Concentrated ownership of a firm by the founder and his or her family might lead to thin liquidity in the market because owners tend to hold their stocks; thus, there is only limited stocks for transactions in the market. As expected, market risk and size premium have a positive effect on excess stock returns; however, considering other factors based on Fama and French, the value premium factor is not significantly linked to capital asset pricing. Lagged return is a variable and an important factor for consideration before making an investment. Additionally, a positive relationship between inflation and excess returns implies that the Indonesian capital market has provided a hedge against inflation.

Keywords: Corwin and Schultz model; excess returns; illiquidity; liquidity, three factors model

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INTRODUCTION

Liquidity is an important factor in determining price and stock returns in the equity market. However, the concept of liquidity is elusive; thus, it is not easy to define and measure it (Hasbrouck & Scwartz, 1988). In earlier analytical models

of capital asset pricing, the liquidity factor is not considered a variable that affects share price as well as risk and return. Amihud and Mendelson (1986) in their seminal paper investigated the relationship between bid–ask spread as a measurement of illiquidity and asset pricing. The authors found bid–ask spread has a positive relationship with asset expected returns; in other words, illiquidity is to be priced by investors. The authors concluded that expected return is a concave function of a stock's bid–ask spread.

Amihud and Mendelson (1986) examined liquidity as a driving factor of asset pricing. Most studies pointed to premiums risks with regards to liquidity (Acharya & Pedersen, 2005; Pastor & Stambaugh, 2003). Recent studies also linked asset pricing model and liquidity as variables that determine a stock's price. A study looking at Tokyo Stock Exchange (Chang, Paff, & Hwang, 2010) indicated a negative (positive) relationship between liquidity (illiquidity) and returns. Amihud and Mendelson (1986); Chiang and Zheng (2015) who studied the impact of illiquidity risk on excess returns found illiquidity risk associates positively with the excess return in G7 countries.

However, Amihud and Mendelson (1986) and the theoretical model of capital asset pricing and liquidity effect proposed Jacoby, Fowler and Gottesman (2000) shows a positive relationship between returns and bid–ask spread at an increasing rate (convex relationship). This model confirms the findings of Brennan and Subrahmanyam (1996); Chordia, Subrahmanyam and Anshuman (2001). The authors found stocks that are not liquid, have higher variability in activity of trading (illiquid), and result in lower expected returns. Assefa and Mollick (2014) showed that liquidity positively affects stock returns in African market, and this supports Jacoby's model. A study of Oslo Stock Market also confirms this finding (Dinh, 2017).

These conflicting findings inspired the present study which is aimed at finding out if there is a premium for illiquidity or a variability of liquidity in the Indonesian capital market. Indonesia is an important emerging capital market. Its market capitalisation in August 2016 was $446.4 billion, an increase of 29.9 percent during the year, which is the highest in Asia. Meanwhile, Indonesia's index grew by 15.32% in year 2016 and it is the fifth highest in the Asia Pacific capital market (www.ojk.id). As investors are risk-averse, they need higher expected returns when there is a variability in liquidity of the stock. Yet, liquidity market as a whole has an influence on investors' expectations of returns (Acharya & Pedersen, 2005), this phenomenon is stated by Chordia, Roll and Subrahmanyam (2000) as commonality in liquidity

Most empirical research on the effect of liquidity and stock returns focused on developed capital markets such as the US (Acharya & Pedersen, 2005; Chordia et al., 2000; Pastor & Stambaugh, 2003); Australia (Marshall & Young, 2003); Spain (Martinez, Nieto, Rubio, & Tapia, 2005). There are very few studies on the liquidity

of the Indonesian stock market. Amanda and Husodo (2014) investigated the relationship between liquidity and stock return using the Fama and French three-factor models. Their analysis showed there is illiquidity premium on excess stock returns in the Indonesian market. Trade initiation by an informed foreigner has an impact on increases in commonality in liquidity (Peranginangin et al., 2016). Meanwhile, the merger between Jakarta and Surabaya stock exchanges into the Indonesian stock exchange significantly affects stock liquidity (Yang & Pangastuti, 2016).

Researchers use several different methods of liquidity to investigate the relationship between liquidity or illiquidity risk and stock returns. Chordia, Roll, and Subrahmanyam (2000) used trading activities and turnover rate as a proxy for liquidity. Amihud (2002) applied illiquidity measure while Amihud and Mendelson (1986) used a bid–ask spread as a measure of liquidity. Amanda and Husodo (2014) applied illiquidity measure from Amihud (2002) in their liquidity analysis in the Indonesian capital market. All these liquidity measurements play significant roles in determining price and stock returns. This paper uses liquidity measure proposed by Corwin and Schultz (2012), a simple method to approximate bid–ask spread from daily low and high prices. This method is more suitable for estimating low-frequency data, which is parallel with our daily return data. It also claims to have outperformed other estimators of liquidity measurement LOT, for example Lesmond, Ogden and Trzcinka (1999) and the covariance estimator from Roll (1984). Thus, this liquidity measurement may help to better explain the excess stock return in the Indonesian capital market.

This paper shows that illiquidity is not a price factor in the Indonesian capital market. It is predicted that only small parts of stocks listed in the market are transacted in the exchange, which leads to thin liquidity. Additionally, majority of the stake in the public-listed company is still held by the founder or his or her family; thus, the securities become dormant stocks. Market risk and size factor (SMB) as predicted become determinant factors in affecting the excess return; however, other Fama and French factors, namely, value premium (HML), do not significantly influence the excess return.

This paper contributes to capital asset pricing theory, especially on the effect of illiquidity premium and excess stock return in several ways. It first explores the Indonesian capital market, categorised as an emerging market, who daily transaction is around US$550 million, which is much lower than daily average transaction in a developed market (illiquid); thus, thin liquidity may have an impact on stock returns in different ways compared with the developed market. Many studies on asset pricing model have been conducted using data from a hybrid quote-driven market such as NYSE. Meanwhile, the Indonesian capital market applies an order-driven market. In this type of market, investors provide liquidity to the market and establish

the bid–ask spread. Additionally, this market is different compared with US market that applies hybrid quote-driven, problems in law enforcement, and unique regulations, especially for free-float stocks, where stocks held by minority shareholders is only 7.5%. Furthermore, foreign investors dominantly hold trading and proportions of ownership. Data from the Indonesian stock exchange show that the proportion of foreign investors was 54% in 2016 (www.idx.co.id). This creates problems in terms of capital flight and liquidity when there are unfavourable issues related to Indonesian and regional macroeconomics and politics. Thus, the Indonesian capital market is still an interesting case study for further analysis of whether the illiquidity risk is a dominant factor in pricing the stock. As a result, this paper contributes to literature with respect to order-driven markets in an emerging country.

Second, in contrast with most liquidity measurements of previous research, this study uses a relative new bid–ask spread of Corwin and Schultz (2012) as a proxy of our liquidity estimator. To the best of the present authors' knowledge, this is the first study to apply this liquidity measurement in the context of the Indonesian capital market.

The rest of the paper is organised as follows: the next section discusses the theoretical and empirical findings of stock liquidity and their impact on price and stock returns. In Section 3, models are developed and data and empirical procedures to test the model are presented. Results are analysed in Section 4, followed by conclusions, comments, and the implications for players and policymakers in Section 5.

LITERATURE REVIEW

The role of liquidity in explaining stock returns attracted the resarch of scholars after Amihud and Mendelson (1986) investigated the relationship between illiquidity, which is measured by the bid–ask spread and asset pricing. The authors explained that the bid–ask spread can be measured as the cost of investors for immediate stock execution. If they do not want to wait for a favourable price, there are premium fees for immediate buying and concession fees for immediate selling. Those transaction costs are reflected in the bid–ask spread quotation and have a negative relationship with the characteristics of stock liquidity (Stoll, 1985). Thus, this bid–ask spread is said to represent measurement of stock illiquidity. Risk-neutral investors will price these costs in valuation of their security, and, consequently, it will reduce their future return. The higher the bid–ask spread, the higher the returns expect by investors; thus, Amihud and Mendelson (1986) concluded that expected return is an increasing and concave function of a stock's bid–ask spread. Datar, Naik and Radcliffe (1998) supported this finding using an alternative measurement of liquidity, namely turnover rate; thus, they found that stock return negatively relates with the liquidity (turnover rate) after controlling for the three-factors proposed by Fama and French. Studies in the United States revealed that liquidity arises as one of dominant risk

factors in determining asset pricing as noted by Acharya and Pedersen (2005); Garleanu (2009); Herdershott and Seasholes (2014); Pastor and Stambaugh (2003).

Brennan and Subrahmanyam (1996) applied different measurements of illiquidity. They used intraday transaction data as proxies of illiquidity measure. Transaction costs are divided into fixed and variable costs (trade-size dependent). Because there is asymmetric information between informed and uninformed traders, illiquidity cost for uninformed traders arises from informed traders. In most cases, the effect of illiquidity from asymmetric information is captured in the price trade volatility, which is part of the variable cost. Using data from NYSE/AMEX stock, Brennan and Subrahmanyam (1996) found that the relationship between premium return and variable costs is concave (positive relationship); this supports Amihud and Mendelson (1986). In contrast, fixed cost has a negative impact on the stock return (convex relationship), as reported by Cordia et al. (2001) and Jacoby (2000).

Bekaert, Harvey and Lundblad (2007); Chiang and Zheng (2015); Lee (2011) analysed the association between liquidity and stock returns. Chiang and Zheng (2015) used samples from G7 countries, and found that d illiquidity is a risk factor in pricing excess stock return. The authors also found market-illiquidity risks are greater for large stocks, higher growth stocks and more liquid stocks. Meanwhile Lee (2011), who expanded upon Acharya and Pedersen's (2005) model, used data from 22 developed countries and 28 emerging markets to document the covariance of stock-owned liquidity with aggregate market liquidity affected stock returns. These returns also depend on the covariance of its own liquidity with local and global market returns. Additionally, liquidity risks are important risk factors in determining the stock return in emerging market as shown by Bekaert et al. (2007). Empirical evidence from developed countries show that liquidity is an important driving factor in asset pricing model. This was proven by Czauderma, Riedle and Wagner (2015) for the German market, Lam and Tam (2011) for the Hong Kong stock market, Chang et al. (2010) and Hu (1997) for the Tokyo stock exchange, and Chan and Paff (2005); Limkriangrai, Durand and Watson (2008) for the Australian market. Meanwhile, Marcello and del Mer Miralles Quiroi (2006); Martinez et al. (2005) studied the Spanish market, while Dinh (2017) the Oslo stock market.

Dey (2005) showed that emerging markets can explain the relationship between liquidity and stock return. He applied turnover as a measurement of liquidity that drives cross-sectional stock returns in more than 40 global market indexes. Using a two-stage GLS regression model, Dey found that liquidity is positively related with the stock return for an emerging market; in contrast, finding for developed markets reveals that volatility in liquidity (illiquidity risk) is positively linked to stock returns. These conflicting findings between two markets were a puzzle for scholars when analysing

the role of liquidity in determining asset pricing in emerging markets. This was confirmed by Jun, Marathe and Shawky (2003) that market liquidity has a positive impact on stock returns. On the other hand, Bekaert et al. (2007) reported that market liquidity risk is an important factor in pricing assets in Southeast Asia and Latin American due to the limited number of stocks and limited funds involved in the transactions; thus, this relationship does not change with the liberalisation process. The authors also suggested that the dynamic relationship between liquidity and stock returns are influenced by the continued process of liberalisation. Lee's study (2011) also supported that liquidity risk is a price factor in emerging markets.

There have been recent studies on the effect of liquidity on stock returns in emerging countries (Assefa & Mollick, 2014). The authors analysed sample from 16 countries in Africa, excluding South Africa, over the period of 1995–2010. Using static and dynamic panel data regression, they confirmed a positive relationship between liquidity and stock returns, which was consistent with that of Dey (2005) and Jun (2003). However, Hearn et al. (2010) also revealed the impact of liquidity and capital asset pricing in a larger sample in Africa, including South Africa. They found that illiquidity risk, as well as size and market risk, are dominant factors in pricing the asset return. Lischewski and Veronkova (2012) focusing on emerging markets (Central and Eastern Europe, especially Polish Market) showed unexpected results. The authors failed to prove the relationship between stock liquidity and stock returns even after controlling with three-factor Fama and French in the Warsaw stock exchange. However, size, market risk, and value are relevant factors in determining the stock price and return.

METHODS

Data and Variables Operation

Data for this study was from daily stock price data (high, low, and closing price) for individual firms in the KOMPAS 100 Index, market price index, market capitalisation, book-to-market value, Indonesian risk-free rate, and macroeconomics data such as GDP growth and inflation rate. Out of 100 listed stocks in KOMPAS 100, only 55 meet our requirements; the firm must be a nonfinancial company, and it must continuously listed in KOMPAS 100 in the period of study from January 2013 to June 2016. Data was obtained from the Indonesian stock exchange's web site for price of stock, market index, company's website for the firm's specific data, risk-free rate from Bank Indonesia website, and Indonesian Center Statistic Biro for macro-economic data.

Daily liquidity stock was constructed using Corwin and Schultz (2012) approach and then employ simple average method to measure the quarterly liquidity. The equation to compute liquidity measure as

proposed by Corwin and Schultz (2012) is as follows:

$$S = \frac{2(e^{\propto} - 1)}{1 + e^{\propto}} \quad (1)$$

where

$$\propto = \frac{\sqrt{2\beta} - \sqrt{\beta}}{3 - 2\sqrt{2}} - \sqrt{\frac{\gamma}{3 - 2\sqrt{2}}} \quad (2)$$

while

$$\beta = E\left(\sum_{j=0}^{1}\left(ln\left(\frac{H_{t+j}^{0}}{L_{t+j}^{0}}\right)\right)^{2}\right) \quad (3)$$

and

$$\gamma = \left[\ln\left(\frac{H_{t,t+1}^{0}}{L_{t,t+1}^{0}}\right)\right]^{2} \quad (4)$$

H_{t+j}^{0} is the highest price at day t+j

L_{t+j}^{0} is the lowest price at day t+J

$H_{t,t+1}^{0}$ is the highest price over day t and t+1

$H_{t,t+1}^{0}$ is the lowest price over day t and t+1

Daily return for each security is calculated using

$$R_i = \frac{Price_t - Price_0}{Price_0} \quad (5)$$

In order to test the liquidity factor, a model was developed that includes other important control variables to estimate the excess returns: three factors from Fama and French, i.e., risk premium, the difference between market return and risk free rate, return on small market portfolios minus return on large market portfolio at given time or SMB, the return on high book market value portfolio minus low book to market value portfolio or HML. This three-factor model is expected to handle anomalies of average returns computation, which are not captured by the CAPM model (Fama & French, 1993).

Size premium factor (SMB) is constructed from the simple average return from small portfolio minus large portfolio. The sample is sorted based on its market capitalisation. As the sample size was small (55), data was categorised into twos—small and large portfolio—before calculating the simple average of small minus big SMB. Using the same method, the value premium factor (HML) is formed from the sorted data based on the book-to-market value ratio of the securities. Past performance of stocks is a consideration for investors executing a transaction. Investors who purchase the past winner or perform well and sell the stocks, which performed poorly in the previous period, could experience positive returns. This momentum strategy was revealed by Jagadesh and Titman (1993). Cakiki, Tang and Yan (2016); Carhart (1997) also studied the effect of momentums. In this paper, the momentum strategy was proxied using a variable lagged one-period return. Additionally, to study the impact of macroeconomic factors on the stock returns, GDP growth and inflation rate were factored into the model based on Assefa and Mollick (2014); Cakiki et al. (2016).

Empirical Models

As documented by earlier studies, stock returns have a positive (negative) correlation

with illiquidity (liquidity). In order to investigate the relationship between liquidity (illiquidity) and excess stock returns, the simple basic CAPM model is followed by including the illiquidity factor:

$$R_{it} - R_F = \propto + \beta_1 LIQ_{it} + \beta_2 RP_t + \varepsilon_t \quad (6)$$

then the panel data model is extended by including Fama–French three factors as follows:

$$R_{it} - R_F = \propto + \beta_1 LIQ_{it} + \beta_2 RP_t + SMB_t + HML_t + Ret_{i,t-1} + \varepsilon_t \quad (7)$$

where R_{it} is the stock return for every firm i, R_F is the risk-free rate, LIQ_{it} is liquidity measurement for firm I measured by the Corwin and Schultz spread, RP_t is the market risk premium, which is equal to $RM_t - RF$, RM_t is the market index. SMB_t is the return on small market portfolios minus return on large market portfolio at given time t. HML the return on high book market value portfolio minus low to book market value portfolio for given quarterly data. $Ret_{i,t-1}$ is previous return stock i.

RESULTS AND ANALYSIS

Descriptive Statistics

Table 1
Descriptive statistics

	Ri	Rf	Ri-Rf	Spread	M_Premium	SMB	HML	INF	GDPG
Mean	0.0222	0.0179	0.0043	1.1075	-0.0059	-0.0101	0.0257	0.0054	0.0139
Max	0.1304	0.0163	0.1142	0.8079	0.0966	0.2126	0.2036	0.0066	0.0403
Min	-0.0314	0.0144	-0.0458	0.5961	0.0196	0.0392	0.0630	0.0063	0.0141
STD	0.0809	0.0009	0.0800	0.1059	0.0385	0.0867	0.0703	0.0002	0.0131

Notes: Ri = Return of individual stock; Rf = Risk free rate; Ri-Rf = The excess return; Spread = bid-ask spread Corwin and Schultz; M_Premium = The market risk premium; SMB = return on small market portfolios minus return on large market portfolio. HML the return on high book market value portfolio minus low to book market value portfolio

Table 1 shows that the mean quarterly excess return for the KOMPAS 100 Index and HML are positive; it also indicates there is premium value to compensate for the risk. The market premium and SMB, however, show negative value in the period studied. Negative value of risk premium could signify capital flight from the capital market to the safer investment places such as fixed-income securities or deposit to the banks. In line with the risk premium, negative value of SMB could indicate that

investors switch to lesser-risk investment in the capital market. There is cost for investors for immediate execution of stock reflected in positive spread.

FINDINGS

The findings of this study are summarised in Table 2. Based on Corwin and Schultz (2012), the bid–ask spread has a significantly negative relationship with the excess return; however, when market risk and other factors are included in the regression, this liquidity factor disappears as an explanatory variable. This could be due to thin liquidity in the Indonesian capital market just like other emerging markets. This phenomenon could be explained by ownership structure in this market. The founder or his/her family members has owns large stake in many public-listed companies in Indonesia. The public has small ownership; even stocks in the market are still owned by the company's internal parties (minimum free-float requirement is only 7.5%). Majority shareholders do not trade and tend to hold their stocks; thus, only a small portion of stocks available in the market are to be transacted. Consequently, we would expect thin liquidity in the market; as a result, this illiquidity factor does not significantly affect price of the stock return. Findings of this study support that of Leirvik, Fiskerstrand and Fjellvikas (2017); Lischewski and Veronkova (2012) who analysed Polish and the Norwegian stock markets respectively.

The current study applied only one measurement of the liquidity method initiated by Corwin and Schultz (2012). As explained by several researchers such as Hasbrouck and Scwartz (1988), the concept of liquidity is elusive. Lesmond (2005a) suggested that to improve accuracy of liquidity of measurement in emerging markets, other methods may fare better. However, some studies use a single measure of liquidity, e.g., Acharya and Pedersen (2005); Amihud and Mendelson (1986); Marcello and del Mer Miralles Quiroi (2006). Recent studies used more than one measure of liquidity such as those by Assefa and Mollick (2014); Chiang and Zheng (2015); Lam and Tam (2011). Whether to apply single or several measurements of liquidity, generally, the authors showed liquidity plays an important role in determining asset price and returns.

The regression table also shows strong evidence to support two of three factors per Fama and French. The market risk factor and size of company as predicted significantly affect excess returns. The study shows market risk factor (RP) is positively related to the excess returns, and size premium (SMB) consistently has been positive and significantly affects excess return; thus, it implies that larger stocks have a lower risk premium than small stocks. Meanwhile, book-to-market or "value premium" (HML) is consistently related with excess returns; however, the relationship is not significant. This is because investors in the Indonesian market trade the stock speculatively; they are concerned over short-term investment and pay less attention to the role of fundamental analysis generated by financial reports. The results support that of Wang and Zu (2004) who examined the Chinese market, where

the size premium enhanced the explanatory model. Meanwhile, market to value is not relevant in explaining returns. Additionally, the present study's findings also support empirical results of de Groot and Verschoor (2002) who showed that small stocks outperform large stocks in India, Korea, Malaysia, Taiwan, and Thailand. However, market-to-book value has a significant effect on stock returns only in Korea, Malaysia, and Thailand.

The previous (one-lagged) return ($R_{i,t-1}$) shows a strong significant effect on excess return. The coefficient of this previous return is negative, which indicates that investors must pay attention on past quarter stock return to avoid the biased model. A negative relationship between these past stock returns and excess returns is also found in G7 country markets (Chiang & Zheng, 2015).

Macroeconomic variables such as inflation rate and GDP growth have a positive link with excess securities returns. However, only inflation rate significantly affects excess returns. A positive relationship between inflation and the excess returns implies that the Indonesian capital market has provided a hedge against inflations; thus, investors need not worry because their funds have been protected from severe inflation.

Table 2
Regression results; dependent variable is the excess return

	1		2		3		4	
C	0.0178		0.0115		0.0151		-0.0008	
	(0.110)		(0.233)		(0.210)		(0.956)	
SPREAD	-0.0196	*	0.0026		0.0057		0.0015	
	(0.062)		(0.777)		(0.533)		(0.872)	
M_PREMIUM			1.5075	***	1.3168	***	1.3291	***
			(0.000)		(0.000)		(0.000)	
SMB					0.2608	***	0.1473	*
					(0.000)		(0.078)	
HML					0.0337		0.1757	
					(0.781)		(0.167)	
Ri(-1)							-0.1198	***
							(0.000)	
INF							3.0124	**
							(0.022)	
GDPG							0.5614	
							(0.188)	
R-squared	0.05297		0.293029		0.313851		0.288301767	

The p-values are shown in the parentheses; ***, ** and * denote significance at 1%, 5% and 10% levels respectively

CONCLUSION

This paper examined whether liquidity is a pricing factor in the Indonesian capital market. As revealed by Amihud and Mendelson (1986); Chiang and Zheng (2015); Pastor and Stambaugh, (2003) the liquidity factor is an important variable in determining the stock return in a developed capital market. This study used the daily stock price data in the KOMPAS 100 Index to measure the bid–ask spread via Corwin and Schultz (2012) as stock liquidity measurement. In examining the relationship between liquidity factor and stock return, the present study expanded the three-factor model by Fama and French (Fama & French, 1993) and included size of company, previous return of each firm, and macroeconomic factors, namely inflation rate and GDP growth.

The results of this study showed there is no relationship between liquidity and stock returns; thus, in the Indonesian capital market, the stock liquidity is not a priced factor. This may be due to thin liquidity in the market. Ownership structure and number of companies listed in the market may be the reason for the market's lack of liquidity. The founders and families still own majority of the stake in the firm and thus, only a small part of ownership goes to the market. Even insiders or founders own some of stocks listed in the market. They keep their stocks in the box; thus, only a small part of the securities actively transacts in the market.

Market risk and size factor (SMB) are factors that affect excess return; however, other Fama and French factors namely, value premium, (HML) do not significantly influence excess return. Speculative trading and holding the value stocks or riskier stocks for the sort time period by investors may not impact the returns; additionally, investors do not pay attention to book value and the fundamental condition of their traded stocks. Past excess return shows significant information content in predicting future excess return. The relationship of this variable is negative leading to investors considering this factor in calculating return investment. Macroeconomic variables, such as when the inflation rate indicates positive relationship, imply there is availability of hedging against inflation in this capital market.

In order to increase liquidity in the market, this study suggest that stock exchange should boost the interest of people doing transactions in the capital market; regulators need to improve their effort to educate investors, in order to further expand the target market, including institutional and individual investors. Financial authorisation is also needed to encourage private companies to raise capital and encourage companies that have listed its stock in the capital market to sell more stock to the public to increase public ownership.

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