JURNAL AKUNTANSI MANAJEMEN DAN EKONOMI

JURNAL AKUNTANSI, MANAJEMEN DAN EKONOMI
Vol. 27, No. 1, 2025, pp. 28-39
Published online in http://jos.unsoed.ac.id/index.php/jame
E-ISSN: 2620-8482

The Influence of Stock Liquidity on Several Measures of Cost of Equity Capital of Companies Listed in Indonesia 2015 to 2022

JUNIOR AULIA ARGA[1], EKO RIZKIANTO[2]

[1,2]*Department of Management, Faculty of Economics and Business, University of Indonesia, Indonesia*

Abstract

Research on the influence of stock liquidity on equity capital cost is still scarce in the context of developing countries. Furthermore, there are differences in the cost of equity proxies in the literature. This study aims to investigate the influence of stock liquidity on companies' cost of equity capital in Indonesia from 2015 to 2022. Through a series of tests conducted, empirical evidence is found that stock liquidity has a significant influence on cost of equity capital estimated by Price-Earning to Growth Model and model by Ohlson & Juettner-Nauroth. As hypothesized, the lower the liquidity of a stock (the higher the value of stock illiquidity Amihud or its bid-ask spread), the higher the cost of equity capital faced by the company, and vice versa. On the other hand, the cost of equity capital estimated with the Capital Asset Pricing Model shows an illiquidity discount for less liquid shares.

Keywords

Cost of Equity Capital; Capital Asset Pricing Model; Abnormal Earning Growth Model; Stock Liquidity; Indonesia

INTRODUCTION

Corporate operating and investment decisions are closely tied to the corporate financing activities, with the cost of capital being a key topic in corporate finance studies (Hu Jun et al., 2022). In addition to being required by corporate managers, other parties such as investors and researchers have their own interests in identifying a company's cost of capital (Botosan and Plumlee, 2005). The cost of capital reflects the minimum return a company needs to achieve on a project/investment, or the cost paid to capital providers for the invested capital. The cost of capital consists of the cost of equity and cost of debt. Over time, the cost of equity has been more extensively explored in academic literature. Unlike debt financing, equity financing has greater uncertainty in returns along with its risk. This is important to understand in depth because it can impact investment decisions, company valuations, and financing strategies.

The cost of equity capital (COEC) has several determinants that influence it, primarily the risk factors faced by the company. The higher the risk, the higher the return expected by investors. In recent decades, a number of researchers in finance have begun considering the possibility of stock liquidity as a factor influencing COEC. Stock liquidity refers to how easily a stock can be traded in the market without significantly impacting its price. According to Bondarenko (2000), liquidity plays a role in investor trading behavior and can influence security prices. Stock liquidity affects the COEC because reduced liquidity increases risk and trading inefficiency, thus raising the required return.

Previous research shows that liquidity is an important consideration in investment decisions (Chen and Sherif, 2016) because it affects stock returns. The study by Amihud and Mendelson (1986) was the first to develop a theoretical model on this topic. They found that stock returns are positively related to the bid-ask spread as a proxy for stock liquidity (Goyal et al., 2023). Subsequently, Datar et al. (1998), Brennan and Subrahmanyam (1996), and Amihud (2002) conducted follow-up research using other proxies for stock liquidity and found results that confirm the positive impact of these measures on average stock returns.

✉Correspondence to:
junior.aulia@ui.ac.id

Received: December 2024
Revised: January 2025
Accepted: February 2025

However, empirical studies on the relationship between stock liquidity and stock returns and/or COEC are still limited to developed countries, particularly in the United States, as noted by Amihud et al. (2015), Chen and Sherif (2016), and Nguyen and Lo (2013). Research on this topic in developing countries on a single-country basis is still rare, as will be explained further in the next chapter. This study is designed to provide empirical references on this topic in developing countries. Developing countries are generally characterized by less developed and inefficient capital markets due to high information asymmetry (Tessema et al., 2017). Capital markets in developing countries also tend to be more volatile, have high transaction costs, and weaker investor protection (Aggarwal et al., 1999, in Muslim and Setiawan, 2021).

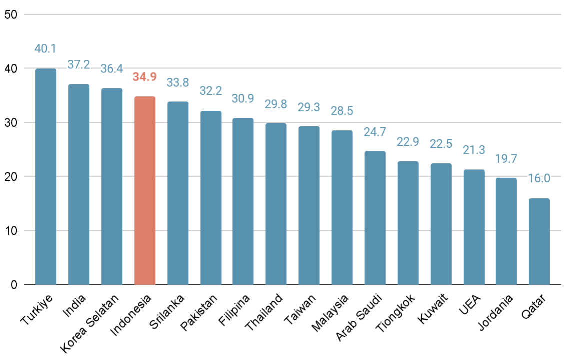
Table 1. Number of Investors and IPOs on the Indonesia Stock Exchange

Year	Number of Investors (SID)	Number of IPOs
2017	1.122.668	37
2018	1.619.372	55
2019	2.484.354	54
2020	3.880.753	50
2021	7.489.337	55
2022	10.300.069	60
2023	±12.160.000	79

Source: EY Global IPO Trends 2023, Indonesia Stock Exchange, Bareksa (2024).

Public companies in the Indonesian capital market can be a relevant research object to fill this research gap. Indonesia is one of the developing countries with the largest economy in Southeast Asia. The Indonesian capital market has a long history and has been rapidly developing recently. Although the market index (IHSG) tends to be volatile, the number of investors and Initial Public Offerings (IPO) has shown a positive growth trend. According to the EY Global IPO Trends 2023 report, Indonesia ranks sixth in the world for the number of IPOs. This indicates companies' confidence in the Indonesian capital market's ability to support their equity capital needs.

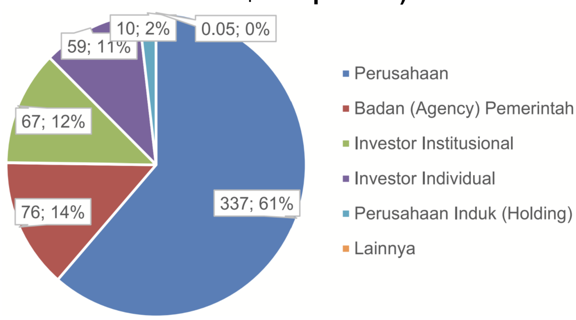
Figure 1. Comparison of Cost of Equity Capital of Companies in Asia (in percent)



Source: Khalifa et al., 2019 (using 2003-2012 data)

Despite these advancements, the Indonesian capital market still faces several challenges. The Indonesian capital market is characterized by high ownership concentration, where most shares are owned by a handful of specific investors. Additionally, low financial literacy among retail investors can hinder their ability to understand and effectively utilize available information, exacerbating the issue of information asymmetry. Related to this, Indonesian companies have relatively high equity costs compared to other Asian countries, partly due to high information asymmetry (Khalifa et al., 2019). This is in line with O'Hara's (2003) statement that the COEC will be higher due to more information asymmetry in the capital market, leading to reduced liquidity among traded stocks (Ebihara et al., 2014). Choosing public companies in the Indonesian capital market as research objects is expected to offer insights that may be relevant to similar studies in other developing countries.

Figure 2. Company Ownership on the Indonesia Stock Exchange by Investor Type (in billion US$ and percent)



Source: Refinitiv Eikon (using data as of October 2023)

This research is also motivated by the differences in the use of proxies for the COEC in the literature. The COEC is related to the expected return from the investor's perspective. However, expected return is something that cannot be directly observed, so several studies use historical realized return data. It has previously been shown that realized return is a poor and noisier measure of expected return (as stated in Elton, 1999; Easton and Monahan, 2005; Lundblad, 2007; Pástor et al., 2008) (Saad and Samet, 2017). Therefore, more recent literature has begun using proxies for the COEC based on company valuation models that utilize earnings forecast data from analyst forecasts. This approach is also rarely applied in research within the Indonesian context.

This study seeks to add reference to the body of financial literature, particularly within the scope of Indonesia, by providing a comprehensive analysis of the influence of stock liquidity on the COEC. It also uses several measures of COEC with different approaches that will enhance the understanding of their validity. The outputs of this study are expected to encourage managers to optimize the COEC, given its implications for the company's finances. The relationship between the trading environment in financial markets and the COEC is crucial to study because it has implications for company value and other corporate financial decisions such as capital structure, equity issuance, and dividend policy (Saad and Samet, 2017).

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

COEC and Its Measurement

In general, the COEC can be defined as the rate of return that a company must pay to investors for the equity capital provided. This reflects the cost required to use the company's capital and serves as a key reference for investors evaluating the investment returns (Hu Jun et al., 2022). It also includes flotation costs of issuing new shares but, in this study, is limited to the required return on equity. This aligns with Ross et al. (2019), who states that the required return on an investment depends on the risk of that investment, not on the source of the funds. The COEC also reflects the return that represents investors' perception of the company's risk (Boubakri et al., 2012). The COEC is directly related to the expected return from equity investments because it explains the financial expectations from the shareholders' perspective (Glova, 2015).

How to calculate or measure the COEC is difficult because there is no direct way to observe the returns that equity investors expect on their investments in the company (Ross et al., 2019). Therefore, the COEC needs to be estimated, and one of the easiest ways to estimate it is by using the dividend growth model.

The dividend growth model is essentially a model for valuing stocks based on the present value of a company's future dividends, assuming a constant dividends growth rate. The required return on a stock (R_e) is estimated using the formula below, which divides the company's next-period dividend (D_1) by the current stock price (P_0), and adds the dividend growth rate (g). This required return can be interpreted as COEC.

$$R_e = (D_1 : P_0) + g = \frac{D_0 x\,(1+g)}{P_0} + g \qquad \textbf{(2.1)}$$

The model can be extended into a two-stage or multi-stage growth model by allowing the dividend growth rate to vary across two or more stages over a specified period. While the model effectively reflects potential returns from dividends, it is most relevant for companies that regularly pay dividends, limiting its applicability. Moreover, the estimated COEC is highly sensitive to the assumed growth rate (g) and does not explicitly account for investment risk (Ross et al., 2019).

Another commonly used method for estimating the COEC is the Capital Asset Pricing Model (CAPM), which relies on company's realized stock returns data. The basic elements of CAPM were historically developed by Markowitz and later extended by Sharpe, Lintner, and Mossin to create a model based on the additional risk assumed over the risk-free rate of investment (Glova, 2015). CAPM calculates the expected return on a stock or portfolio using three key factors: the risk-free rate (Rf), the market risk premium $(Rm - Rf)$, and beta (β). Beta represents the sensitivity of a company's stock returns to market returns. The relation between expected return and these factors is expressed in the following equation.

$$E(R)_i = Rf + (Rm - Rf)\,\beta_i \qquad \textbf{(2.2)}$$

The method of estimating the COEC using CAPM, on the other hand, faces several criticisms in the financial literature. For example, Elton (1999) argues that realized return is a less suitable and potentially biased proxy for the COEC. Fama and French (1997) concluded that single-factor models, such as CAPM, and the Fama-French three-factor model produce inaccurate estimates of the COEC (Ben-Nasr et al., 2009). Estimations of risk premiums and beta also need to be conducted accurately to produce reliable outputs (Ross et al., 2019). Furthermore, Barnes and Lopez (2006) noted that COEC estimates using CAPM cannot be significantly improved by adding factors to the model, using panel regression methods, narrowing peer groups, or adjusting for leverage or business concentration.

Therefore, accounting and finance researchers have proposed alternative models for estimating the COEC, aiming to find the return rate that aligns with the current stock price given the expected future earnings and dividends. This method has intuitive appeal and provides a more forward-looking expected return by utilizing forecasted company's cash flow data (Paton et al., 2020; Echterling et al., 2015). These estimates are generally derived from reverse-engineering company valuation models, such as the residual income valuation model and the abnormal earnings growth model (Echterling et al., 2015). In particular, the abnormal earnings growth model includes the Price-Earnings (PE) Model, Price-Earnings to Growth (PEG) Model, Modified Price-Earnings to Growth (MPEG) Model, and the model by Ohlson & Juettner-Nauroth (2005) or the OJN Model. This study uses two models, namely the PEG Model and the OJN Model.

The PEG Model was developed by Easton (2004) from the Price-Earnings Ratio divided by the short-term earnings growth rate. This model is based on a two-year time horizon for the company's earnings forecasts. The model assumes constant abnormal earnings and no dividends in period t+1 (Easton, 2004; F. Echterling et al., 2015). The COEC using the PEG Model is estimated as follows, where E_{it+1} and E_{it+2} are the forecasted earnings per share for company i in years t+1 and t+2, respectively, and P_{it} is the closing stock price at the end of year t.

$$COEC_{it}^{PEG} = \sqrt{(E_{it+2} - E_{it+1})/P_{it}} \quad \textbf{(2.3)}$$

From the basic approach of the PEG Model, Ohlson & Juettner-Nauroth (2005) developed a specialized model for estimating the COEC (F. Echterling et al., 2015). They constructed a new model by relaxing the assumptions of the PEG Model regarding the company's abnormal earnings and dividends in year t+1. Gode & Mohanram (2003) then operationalized this theoretical model, assuming the short-term growth rate (G_{st}) is the forecasted earnings growth rate for year t+2 and abnormal earnings growth (G_{aeg}) is equal to risk-free rate minus 3%, which reflects that the company's long-term growth rate is the same as the economic growth rate. The formula for estimating COEC using the OJN Model, as operationalized by Gode & Mohanram, is:

$$COEC_{it}^{OJN} = A + \sqrt{A^2 + \frac{E_{it+1}}{P_{it}}(G_{st} - G_{aeg})} \quad \textbf{(2.4)}$$

where $A = \frac{1}{2}\, G_{aeg}$, and $G_{aeg} = (Rf_t - 3\%)$, and then $G_{st} = (E_{it+2} - E_{it+1})\,/\,E_{it+1}$.

Although the literature offers several methods for estimating the COEC, a concrete and accurate method has not yet been agreed upon in the accounting and finance literature. Each method has its own assumptions, limitations, and advantages, which will be discussed in the next chapter within the scope and context of this research.

Stock Liquidity

One of the most acknowledged descriptions of stock liquidity comes from Weimin Liu. Liu (2006) defines liquid stocks as those that can be traded in large volumes quickly, at low cost, and with minimal impact on the price (Le and Gregoriou, 2020). According to that, stock liquidity has four dimensions: trading cost (the extent to which a security can be traded at a certain cost); trading speed (the extent to which a security can be traded in a specified amount); trading quantity (all costs related to trading a security in a given amount); and price impact (how easily a security can be traded in a given amount with minimal impact on the price).

Koetin (2001) defines stock liquidity as the ease with which a stock owner can trade their shares. Lipson and Mortal (2009) describe liquid securities as those that can be traded easily. The Indonesia Stock Exchange defines stock liquidity as the ease of liquidating investment capital (Mulyana, 2011). The liquidity of a company's stock can also be understood in terms of how easily the company can raise external capital through stock offerings (Udomsirikul et al., 2011).

Stock liquidity is also related to the overall market liquidity conditions, which reflect the number of buyers and sellers in the market who are willing to exchange securities at a price without delay (Amihud et al., 2006, in Naik and Reddy, 2021). Market liquidity fluctuates, declining during market downturns and recovering during upturns (Chordia et al., 2001, in Saad and Samet, 2017). Brunnermeier and Pedersen (2009) argue that during downturns, financial institutions face funding constraints, reducing the supply of liquidity in the market (Saad and Samet, 2017). Capital outflows further shrink investor funds, making it more difficult to trade securities without significant price changes.

There are several ways to measure stock liquidity. One of them is the bid-ask spread (quoted or effective). The bid-ask spread is a benchmark measure of stock liquidity, as used by Amihud and Mendelson (1986) and Lesmond (2005). It is calculated as the difference between the ask and bid price of a stock, divided by their average. This spread reflects asymmetric information between the two parties transacting in a stock at a given time. The issue with this measure is the limited availability of data for some markets/countries, so it would be easier to estimate liquidity from other available data (Armitage et al., 2014). This also includes the difficulty in obtaining real ask and bid data, which then can cause potential bias.

Another widely used measure of stock liquidity, as emphasized by Lou and Shu (2017), is the Amihud (2002) stock illiquidity. It is calculated as the absolute value of daily stock returns divided by daily trading volume. Amihud (2002) developed this more general measure to be easily adapted in markets worldwide (Lesmond, 2005). Unlike the bid-ask spread, Amihud's stock illiquidity is easier to compute since it only requires price and trading volume data, which are always available in the market. It can still be computed on trading days without price changes, though it cannot be computed if the trading volume is zero (Armitage et al., 2014).

Other measures of stock liquidity include share turnover ratio, implicit measure of effective bid-ask spread (Roll, 1984), Lesmond-Ogden-Trzcinka/LOT model (Lesmond et al., 1999), and the number of days with zero trading volume (Liu, 2006).

Hypothesis and Empirical Review

This study tests the hypothesis whether stock liquidity is related to the COEC (where an increase in stock liquidity reduces the COEC by lowering the required return). This relationship is based on the theoretical model of Amihud and Mendelson (1986), which first incorporated liquidity factors into asset pricing. They formulated that shareholders would demand a higher risk premium for holding/trading less liquid stocks, leading to higher expected returns. A similar theoretical model was formulated by Liu (2006) based on the Fama and French (1996) model, introducing liquidity factors to differentiate returns between low and high liquidity portfolios. This liquidity-augmented CAPM model shows that firms with higher liquidity risk receive higher returns as compensation for the risk (Liu, 2006; Lin et al., 2009).

The role of stock liquidity on returns and/or the COEC has been confirmed by several empirical studies. In the context of developing countries, Hosseinpour et al. (2022) in their research on the Iranian stock market state higher liquidity risk (low turnover ratios) is associated with lower stock returns. Loukil et al. (2010) also found similar results in their study in Tunisia, using four liquidity proxies. Regarding costs, Armitage et al. (2014) found in Ukraine that trading costs are closely linked to stock liquidity. Specifically, low-liquidity stocks tend to have higher trading costs, indicating greater risk. Another reference with a cross-country approach can be found in Bekaert et al. (2007), who explored the impact of stock liquidity on returns in developing countries. They concluded that the proportion of zero daily returns, as a liquidity proxy, significantly predicts stock returns in 19 developing countries (Nguyen and Lo, 2013). More recently, Saad and Samet (2017) examined stock liquidity's effect on COEC in 52 countries, concluding that a decrease in liquidity levels (and an increase in liquidity risk) tends to be followed by an increase in the COEC.

H1: "Stock liquidity has a significant negative effect on the COEC."

There are at least three main determinants of the COEC: company's size, book-to-market ratio, and financial leverage. The COEC is negatively related to company size, as predicted by Fama and French (1992). Larger or more established companies generally have a lower COEC, as they face less risk compared to newer or smaller firms. Fama and French (1992) also demonstrated that stock returns are positively related to the book-to-market ratio. A high book-to-market ratio indicates that a stock is likely undervalued by the market (value stock), while a low book-to-market ratio suggests that the stock may be overvalued by the market (growth stock). Additionally, financial leverage affects the COEC because high leverage risk leads to higher required returns from investors, and vice versa (Modigliani and Miller, 1958 in Ben-Nasr et al., 2009). Another determinant, particularly when using the CAPM estimation method, is the stock beta. The CAPM equation implies that the COEC is a function of the stock beta and risk premium, suggesting a positive relationship between beta and the COEC.

Building on the explanation above, four additional hypotheses are formulated regarding the determinants of the COEC.

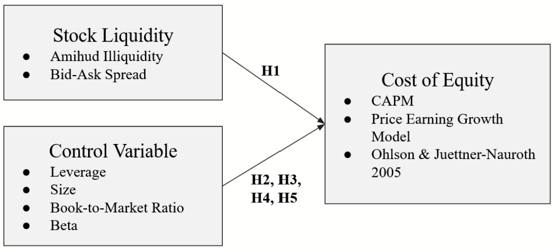
H2: "Financial leverage has a significant positive effect on the COEC."

H3: "Company size has a significant negative effect on the COEC."

H4: "Book-to-market ratio has a significant positive effect on the COEC."

H5: "Stock beta has a significant positive effect on the COEC."

Figure 3. Research Framework of the Study



Source: Authors (2024)

RESEARCH METHODS

A linear regression model is constructed to quantitatively assess the influence of stock liquidity on the COEC (measured by several proxies), while also including firm-specific COEC determinants as control variables. To gain a more in-depth analysis, this study uses 2 stock liquidity proxies and 3 COEC proxies. Thus, the framework above can be further elaborated into 6 specific equations for each of the proxies used.

$$COEC_{it}^{CAPM} = \beta_0 + \beta_1 ILLQ_{it} + \beta_2 TDR_{it} + \beta_3 SIZE_{it} + \beta_4 BTM_{it} + \mu_{it} \quad \textbf{(3.1)}$$

$$COEC_{it}^{CAPM} = \beta_0 + \beta_1 SPRD_{it} + \beta_2 TDR_{it} + \beta_3 SIZE_{it} + \beta_4 BTM_{it} + \mu_{it} \quad \textbf{(3.2)}$$

$$COEC_{it}^{PEG} = \beta_0 + \beta_1 ILLQ_{it} + \beta_2 TDR_{it} + \beta_3 SIZE_{it} + \beta_4 BTM_{it} + \beta_5 BETA_{it} + \mu_{it} \quad \textbf{(3.3)}$$

$$COEC_{it}^{PEG} = \beta_0 + \beta_1 SPRD_{it} + \beta_2 TDR_{it} + \beta_3 SIZE_{it} + \beta_4 BTM_{it} + \beta_5 BETA_{it} + \mu_{it} \quad \textbf{(3.4)}$$

$$COEC_{it}^{OJN} = \beta_0 + \beta_1 ILLQ_{it} + \beta_2 TDR_{it} + \beta_3 SIZE_{it} + \beta_4 BTM_{it} + \beta_5 BETA_{it} + \mu_{it} \quad \textbf{(3.5)}$$

$$COEC_{it}^{OJN} = \beta_0 + \beta_1 SPRD_{it} + \beta_2 TDR_{it} + \beta_3 SIZE_{it} + \beta_4 BTM_{it} + \beta_5 BETA_{it} + \mu_{it} \quad \textbf{(3.6)}$$

The COEC serves as dependent variable and is estimated using 3 models as follows:

Capital Asset Pricing Model ($COEC^{CAPM}$)

The COEC using CAPM is estimated with the formula below,

$$COEC_{it}^{CAPM} = Rf + (Rm - Rf)\,\beta_{it} \quad \textbf{(3.7)}$$

where Rf is the average return on the 1-year Indonesian Government Treasury Bills from 2015-2022, $(Rm - Rf)$ is the average equity risk premium from 2015-2022 taken from the database by Aswath Damodaran, and β_{it} is the annual beta of the company's stock.

Price-Earning to Growth Model ($COEC^{PEG}$)

The COEC using the PEG Model is estimated with the formula below,

$$COEC_{it}^{PEG} = \sqrt{(E_{it+2} - E_{it+1})/P_{it}} \quad \textbf{(3.8)}$$

where E_{it+n} is the forecasted earnings per share of company i for year t+n, and P_{it} is the closing stock price at the end of year t.

Ohlson & Juettner-Nauroth (2005) Model ($COEC^{OJN}$)

The COEC using the OJN model is estimated with the following formula:

$$COEC_{it}^{OJN} = A + \sqrt{A^2 + \frac{E_{it+1}}{P_{it}}(G_{st} - G_{aeg})} \quad \textbf{(3.9)}$$

where $A = \frac{1}{2} G_{aeg}$ and $G_{aeg} = (Rf_t - 3\%)$ and then $G_{st} = (E_{it+2} - E_{it+1}) / E_{it+1}$, following the implementation of Gode & Mohanram (2003).

Stock liquidity, as an independent variable, is measured using the Amihud (2002) stock illiquidity, while the bid-ask spread is also included for robustness testing.

Amihud's Stock Illiquidity (2002)

Amihud's stock illiquidity (ILLQ) is described as the ratio of the absolute stock return (R_{iym}) to its trading volume (VOL_{iym}) over a specific period, averaged over the year. A higher value of ILLQ indicates lower stock liquidity, and vice versa. Amihud uses an inverse measure of stock liquidity to avoid using zero as a denominator. The multiplier of 10^9 is an additional factor to enhance the representation of the ILLQ value.

$$ILLQ_{it} = \frac{1}{m}\sum_{m=1}^{m_{iy}} \frac{|R_{iym}|}{VOLM_{iym}} \quad (x \quad 10^9) \quad \textbf{(3.10)}$$

Bid-Ask Spread

Bid-ask spread (SPRD) is the gap between the stock's highest bid and lowest ask price at a given time, divided by the average of that bid and ask. A narrower SPRD indicates ease of transaction for a stock, suggesting adequate liquidity, and vice versa. Thus, SPRD is also an inverse measure of stock liquidity. The SPRD for company i in year t is calculated by averaging the monthly bid-ask spreads (m), which can be formulated as follows:

$$SPRD_{it} = \frac{1}{m}\sum_{m=1}^{m_{iy}} (bid_{iym} - ask_{iym}) / (\frac{bid_{iym}+ask_{iym}}{2}) \quad \textbf{(3.11)}$$

This study involves four control variables, which have been widely recognized by researchers as key determinants of COEC: financial leverage/TDR (total debt ratio), firm size/SIZE (natural logarithm of total assets), book-to-market ratio/BTM, and stock beta/BETA (a measure of a stock's responsiveness to broad market movements).

Data is collected using the Refinitiv Eikon database (primary source) along with Yahoo Finance and company financial reports (complementary sources). The panel dataset combines time-series data from 2015 to 2022 (annual) with cross-sectional data on companies listed on the Indonesia Stock Exchange. The sample is formed using purposive sampling. It includes all non-financial companies on the Indonesia Stock Exchange with sufficient data for the required variables. To ensure data quality, outliers (extreme values and anomalies) are removed through further screening. After this sampling process, the final sample consists of 68 companies with 299 firm-year observations.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2. Descriptive Statistics of All Variables

	Mean	Max.	Min.	Std. Dev
$COEC^{CAPM}$	0,1550	0,2902	0,0592	0,0489
$COEC^{PEG}$	0,1587	0,5735	0,0041	0,1083
$COEC^{OJN}$	0,1662	0,5903	0,0138	0,1104
ILLQ	1,1920	61,059	0,0202	3,9436
SPRD	0,0070	0,0664	-0,0132	0,0059
TDR	0,2230	0,7962	0,0000	0,1796
SIZE	30,687	33,537	27,989	1,1676
BTM	0,7490	3,3732	0,0159	0,6571
BETA	1,2781	2,9400	0,0300	0,6365
Number of data = n = 299				

Source: Authors, processed with Eviews 10 (2024)

The table above presents the summary statistics for each variable included in the model. The COEC using CAPM shows a similar central tendency to the COEC using PEG and OJN model, but has a slightly lower average and narrower dispersion, reflected in its lower standard deviation. Liquidity proxies, ILLQ and SPRD, exhibit different data characteristics. ILLQ has a higher average, and both proxies show contrasting data dispersion. Note that negative SPRD values can occur for some companies during certain periods due to significantly higher ask prices, resulting in negative annual averages.

Estimation Results

After series of estimation and testing, it was found that stock liquidity measured using ILLQ has a significant impact on the COEC under the CAPM. However, its negative coefficient suggests that ILLQ affects the COEC in the opposite direction of the initial hypothesis. Two of the three control variables significantly affecting the COEC under CAPM are firm size and book-to-market ratio. However, their coefficients contradict the hypothesis, which posits that firm size has a negative impact and book-to-market ratio has a positive impact.

Table 3. Estimation Results of (3.1), (3.3), and (3.5) Equation

	$COEC^{CAPM}$	$COEC^{PEG}$	$COEC^{OJN}$
ILLQ	-0,001** (0,001)	0,005*** (0,001)	0,005*** (0,001)
TDR	-0,014 (0,031)	0,046 (0,041)	0,054* (0,041)
SIZE	0,011* (0,008)	-0,005 (0,006)	-0,007 (0,007)
BTM	-0,011** (0,005)	0,071*** (0,009)	0,072*** (0,010)
BETA	-	0,024*** (0,010)	0,021** (0,010)
Intercept	-0,181	0,233	0,271
n	299	299	299
Prob. F-Stat	0,000	0,000	0,000
Adj. R^2	0,5864	0,2083	0,2075
*Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard error in parentheses. Tests use the optimal panel data model, passing heteroskedasticity and multicollinearity tests.*			

Source: Authors, processed with Eviews 10 (2024)

On the other hand, the significant impact of ILLQ on the COEC using PEG Model is evident from the estimation results. Its positive coefficient indicates a direct effect on the COEC. As the stock illiquidity value increases (i.e., as stock liquidity decreases), the COEC under PEG Model also increases, and vice versa. Two control variables, book-to-market ratio and stock beta, are identified as having a significant effect on the PEG Model's COEC, with positive coefficients aligning with its movement. Financial leverage and firm size have weak significance, suggesting their influence can be disregarded.

The estimation results also show that ILLQ has a significant impact on the COEC under the OJN Model. It is found that the significant effect of ILLQ is positive, aligned with the direction of the hypothesis. Furthermore, three control variables—financial leverage, book-to-market ratio, and stock beta—are found to significantly influence the OJN Model's COEC. The positive coefficients indicate that these variables move in the same direction as the COEC under OJN Model, reinforcing their impact within the model.

In summary, the estimation and testing results tentatively conclude that there is a significant impact of stock liquidity (ILLQ) on the COEC, particularly when estimated using the PEG Model and the OJN Model. As Amihud's stock illiquidity increases (indicating lower stock liquidity), the COEC faced by the company also increases, and vice versa. In contrast, COEC estimation from CAPM did not support the primary hypothesis in previous tests.

Robustness Test

Table 4. Estimation Results of (3.2), (3.4), and (3.6) Equation

	$COEC^{CAPM}$	$COEC^{PEG}$	$COEC^{OJN}$
SPRD	-0,620* (0,420)	2,446*** (0,970)	2,570*** (0,992)
TDR	-0,013 (0,031)	0,055* (0,043)	0,064** (0,043)
SIZE	0,010 (0,009)	-0,005 (0,007)	-0,006 (0,007)
BTM	-0,010** (0,005)	0,069*** (0,010)	0,070*** (0,010)
BETA	-	0,023** (0,010)	0,020** (0,010)
Intercept	-0,145	0,203	0,243
N	299	299	299
Prob. F-Stat	0,000	0,000	0,000
Adj. R^2	0,5839	0,1891	0,1879
*Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard error in parentheses. Tests use the optimal panel data model, passing heteroskedasticity and multicollinearity tests.*			

Source: Authors, processed with Eviews 10 (2024)

To enhance the reliability of the previous findings, additional tests were conducted as part of robustness check. After re-estimating and re-testing by substituting the stock liquidity proxy with SPRD, additional evidence was obtained that SPRD also significantly affects the COEC under the PEG and the OJN Model, with positive coefficients in both cases. When the COEC is estimated using CAPM, the use of SPRD as a proxy shows a significant effect, but its coefficient indicates that the impact is contrary to the expected relationship with COEC. These robustness test results further validate that the main hypothesis of this research is confirmed in models involving the PEG and the OJN Model.

Discussion

The series of tests discussed above generally provide evidence consistent with previous empirical studies. Stock liquidity significantly impacts the COEC, particularly when measured by the PEG and the OJN Model. Lower stock liquidity (or higher ILLQ and SPRD) results in a higher COEC, and vice versa. The findings also reveal other aspects worthy of further discussion, where CAPM, used to estimate the COEC, captures a direction opposite to the expected results. Despite their significance, ILLQ and SPRD yield negative coefficients, suggesting that less liquid stocks are "discounted," as investors tend to require lower returns under the model with CAPM.

These results are in line with Nguyen and Lo (2013), who identified a liquidity effect on stock returns in New Zealand. They found an "illiquidity discount," where less liquid stocks exhibited lower returns than those with higher liquidity. Their conclusions were robust even after controlling for risk factors and company characteristics that might affect returns. Previously, Eun and Huang (2007) reported similar findings, stating that investors in the China market are willing to pay a premium for more liquid stocks. More recently, Leirvik et al. (2017) found no significant effect of various stock liquidity proxies on returns in Norway. Marshall and Young (2003) also reported mixed results in Australia, with the relationship between stock liquidity and returns varying based on the proxies used.

In terms of the impact of firm-specific control variables on the COEC, this chapter concludes that financial leverage (partially), book-to-market ratio, and stock beta substantially affect the COEC measured by the PEG and the OJN Model. However, the CAPM-based COEC is only influenced by book-to-market ratio, while firm size has no influence across all tested regression models.

CAPM, as a model for estimating the COEC, has limitations and assumptions that can affect its accuracy. Fama and French (1997) noted that the COEC estimation using CAPM is unavoidably imprecise, with a standard error >3% annually at the industry level and larger at the company level (Barnes and Lopez, 2006). Elton (1999) pointed out that realized returns are not a relevant proxy and are, on average, lower than the risk-free rate. Furthermore, CAPM requires estimating the market risk premium and beta. If these estimates are inaccurate, the resulting COEC will be as well (Ross et al., 2019).

Despite its shortcomings, the textbook treatment of COEC typically involves the CAPM (Barnes and Lopez, 2006). It is widely applicable to various companies, including those not limited to stable dividend growth/development (Ross et al., 2019). Additionally, CAPM explicitly adjusts for the level of risk faced by the company (Ross et al., 2019). Despite academic criticisms, CAPM remains a preferred model in finance education, and managers continue to use it Da et al., 2012).

Estimating the COEC using the abnormal earnings growth model also faces limitations due to its inherent assumptions, as discussed in the literature review. Analysts' forecasts of company earnings, key inputs for the model, can be overly optimistic, which can reduce the accuracy of the estimates (Kothari, 2001 in Belkhir et al., 2020). These forecasts are also subject to potential biases and conflicts of interest with the companies in question. Essentially, this approach is distinct from CAPM, as evidenced by the lack of correlation between the two (Frank and Shen, 2016). This weak correlation is also observed in this study's data, with a correlation value of only around 0.2.

Pastor et al. (2008) empirically demonstrated that COEC models involving earnings forecasts are superior to models using realized returns in terms of detecting the risk-return tradeoff and time-varying expected returns. This is supported by Chava and Purnanandam (2010), who showed that risk-return tradeoff findings can vary significantly depending on how expected returns are estimated. Li et al. (2013) also confirmed that models involving earnings forecasts perform better than traditional ratios in predicting future stock returns.

CONCLUSIONS

This study aims to answer the question of how stock liquidity affects the COEC, focusing on the Indonesian market from 2015 to 2022, analyzing 68 sample companies using various measures of key variables for a comprehensive analysis. The tests conducted reveal that stock liquidity has a significant negative impact on the COEC, especially for the COEC estimated using the PEG and the OJN Model. This conclusion is robust when using SPRD as an alternative liquidity proxy. As hypothesized, lower stock liquidity (higher Amihud's stock illiquidity or bid-ask spread) is related to a higher COEC, and vice versa. The COEC estimated using CAPM shows an illiquidity discount, where less liquid stocks exhibit lower returns than more liquid ones.

This study has several notable limitations. First, the number of samples is limited due to the unavailability of earnings forecast data for certain companies. This issue also restricts the use of residual income valuation models. Second, the floatation costs are excluded from the COEC scope, though these costs can differentiate the costs for companies with the same required return. Third, the stock liquidity is limited to only two proxies, each representing one liquidity dimension, potentially leading to inconsistent results when using other proxies. Lastly, the earnings forecasts and bid-ask data may be subject to biases, such as forecast bias from analysts, end-of-day/month effect, and measurement bias due to the absence of real bid-ask data.

Considering the findings of this study, company management should recognize the substantial impact of stock liquidity on the COEC dynamics. Management can make efforts to enhance stock liquidity in order to reduce the COEC, such as through stock splits (Ji-Chai Lin et al., 2009), optimizing information disclosure (Jeffrey Ng, 2011; B. Danielsen et al., 2014), and implementing digital transformation (L. Ren and Q. Hao, 2023). Liquidity factors should be considered by investors and other market participants as they can affect security prices. Researchers and academics can further continue or replicate studies with similar topics in other emerging markets to contribute to the literature.

REFERENCES

Aggarwal, R.; Inclan, C.; Leal, R. (1999). Volatility in Emerging Stock Markets. *Journal of Finance Quantitative Analysis.* doi.org/10.2307/2676245

Amihud, Y., Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics.*. doi.org/10.1016/0304-405X(86)90065-6

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets*. doi.org/10.1016/S1386-4181(01)00024-6

Amihud, Y., Hameed, A., Kang, W., & Zhang, H. (2015). The illiquidity premium: International evidence. *Journal of Financial Economics*. doi.org/10.1016/j.jfineco.2015.04.005

Amihud, Y., Mendelson, H., & Pedersen, L. H. (2006). Liquidity and asset prices. *Foundations and Trends in Finance*. doi.org/10.1561/0500000003

Armitage, S., Brzeszczyński, J., & Serdyuk, A. (2014). Liquidity Measures and Cost of Trading in an Illiquid Market. *Journal of Emerging Market Finance.* doi.org/10.1177/0972652714541340

Bareksa. (2022). *Pasar Modal Indonesia 2022: Rekor Indeks Saham hingga Jumlah Investor Tembus 10,3 Juta*. Accessed from https://s.id/CJcny April 14, 2024.

Barnes, M. L., & Lopez, J. A. (2006). Alternative measures of the Federal Reserve Banks' cost of equity capital. *Journal of Banking & Finance*. doi.org/10.1016/j.jbankfin.2005.09.005

Belkhir, M., Saad, M., & Samet, A. (2020). Stock extreme illiquidity and the cost of capital. *Journal of Banking & Finance.* doi.org/10.1016/j.jbankfin.2018.01.005

Ben-Nasr, H., Boubakri, N., & Cosset, J.-C. (2009). Ownership structure and earnings quality: Evidence from newly privatized firms.

Bondarenko, O. (2000). Competing Market Makers, Liquidity Provision, and Bid-Ask Spread. *SSRN Electronic Journal.* doi.org/10.2139/ssrn.253894

Botosan, C. A., & Plumlee, M. A. (2005). Assessing Alternative Proxies for the Expected Risk Premium. *The Accounting Review*. www.jstor.org/stable/4093160

Boubakri, N., Guedhami, O., Mishra, D., & Saffar, W. (2012). Political connections and the cost of equity capital. *Journal of Corporate Finance.* doi.org/10.1016/j.jcorpfin.2012.02.005

Brennan, M. J., & Subrahmanyam, A. (1996). Market microstructure and asset pricing: On the compensation for illiquidity in stock returns. *Journal of Financial Economics.* doi.org/10.1016/0304-405X(95)00870-K

Brunnermeier, M.K., Pedersen, L.H., (2009). Market liquidity and funding liquidity. *The Review of Financial Studies.* doi.org/10.1093/rfs/hhn098

Chava, S., Purnanandam A. (2010). Is Default Risk Negatively Related to Stock Returns?, *The Review of Financial Studies*. doi.org/10.1093/rfs/hhp107

Chen, J., & Sherif, M. (2016). Illiquidity Premium and Expected Stock Returns in the UK: A New Approach. *Physica A: Statistical Mechanics and Its Applications*.

Chordia, T., Roll, R., Subrahmanyam A. (2001). Market Liquidity and Trading Activity. *The Journal of Finance*. doi.org/10.1111/0022-1082.00335

Da, Z., Guo, R.-J., & Jagannathan, R. (2012). CAPM for estimating the cost of equity capital: Interpreting the empirical evidence. *Journal of Financial Economics.* doi.org/10.1016/j.jfineco.2011.08.011

Danielsen, B., Harrison, D., van Ness, R., & Warr, R. (2014). Liquidity, Accounting Transparency, and the Cost of Capital: Evidence from Real Estate Investment

Trusts. *Journal of Real Estate Research*. doi.org/10.1080/10835547.2014.12091389

Datar, V. T., Y. Naik, N., & Radcliffe, R. (1998). Liquidity and stock returns: An alternative test. *Journal of Financial Markets.* doi.org/10.1016/S1386-4181(97)00004-9

Easton, P. D. (2004). PE Ratios, PEG Ratios, and Estimating the Implied Expected Rate of Return on Equity Capital. *The Accounting Review*. www.jstor.org/stable/3203313

Easton, P. D., & Monahan, S. J. (2005). An Evaluation of Accounting-Based Measures of Expected Returns. *The Accounting Review.* www.jstor.org/stable/4093067

Ebihara, T., Kubota, K., Takehara, H., & Yokota, E. (2014). Market liquidity, private information, and the cost of capital: Market microstructure studies on family firms in Japan. *Japan and the World Economy*. doi.org/10.1016/j.japwor.2014.07.001

Echterling, F., Eierle, B., & Ketterer, S. (2015). A review of the literature on methods of computing the implied cost of capital. *International Review of Financial Analysis.* doi.org/10.1016/j.irfa.2015.08.001

Elton, E. J. (1999). Presidential Address: Expected Return, Realized Return, and Asset Pricing Tests. *The Journal of Finance*. doi.org/10.1111/0022-1082.00144

Eun, Cheol S. & Huang, Wei. (2007). Asset pricing in China's domestic stock markets: Is there a logic?. *Pacific-Basin Finance Journal.* doi.org/10.1016/j.pacfin.2006.11.002

EY. 2024. EY Global IPO Trends. Accessed from https://s.id/oWUME/ April 14, 2024.

Fama, E. F., & French, K. R. (1996). Multifactor Explanations of Asset Pricing Anomalies. *The Journal of Finance*. doi.org/10.1111/j.1540-6261.1996.tb05202.x

Fama, E. F., & French, K. R. (1997). Industry costs of equity. *Journal of Financial Economics*. doi.org/10.1016/S0304-405X(96)00896-3

Frank, M. Z., & Shen, T. (2016). Investment and the weighted average cost of capital. *Journal of Financial Economics.* doi.org/10.1016/j.jfineco.2015.09.001

Glova, J. (2015). Time-varying CAPM and its Applicability in Cost of Equity Determination. *Procedia Economics and Finance*. doi.org/10.1016/S2212-5671(15)01365-9

Gode, D., & Mohanram, P. (2003). Inferring the Cost of Capital Using the Ohlson-Juettner Model. *Review of Accounting Studies.* doi.org/10.1023/A:1027378728141

Goyal, A., Subrahmanyam, A., & Swaminathan, B. (2023). Illiquidity and the cost of equity capital: Evidence from actual estimates of capital cost for U.S. data. *Review of Financial Economics*. doi.org/10.1002/rfe.1179

Hosseinpour, H., Khodamipour, A., & Pourheidari, O. (2023). The impact of the prospect theory value on the relationship between liquidity risk and returns. *International Journal of Islamic and Middle Eastern Finance and Management*. doi.org/10.1108/IMEFM-12-2021-0478

Hu, J., Long, W., Dai, M., & (Troy) Yao, D. (2022). Does international experience of managers bring financing benefits? Evidence from the cost of equity capital. *Journal of Contemporary Accounting & Economics.* doi.org/10.1016/j.jcae.2021.100294

Jeffrey Ng. (2011). The Effect of Information Quality on Liquidity Risk. *Journal of Accounting & Economics.*

Khalifa, M., Zouaoui, H., ben Othman, H., & Hussainey, K. (2019). Exploring the nonlinear effect of conditional conservatism on the cost of equity capital: Evidence from emerging markets. *Journal of International Accounting, Auditing and Taxation*. doi.org/10.1016/j.intaccaudtax.2019.100272

Koetin. (2011). *Analisis Pasar Modal (4th ed.)*. Pustaka Sinar Harapan.

Le, H., & Gregoriou, A. (2020). How Do You Capture Liquidity? A Review of the Literature on Low-Frequency Stock Liquidity. *Journal of Economic Surveys*. doi.org/10.1111/joes.12385

Leirvik, Fiskerstrand, Fjellvikas. (2017). Market Liquidity and Stock Returns in the Norwegian Stock Market. *Finance Research Letters*. dx.doi.org/10.1016/j.frl.2016.12.033

Lesmond, D. (2005). Liquidity of emerging markets. *Journal of Financial Economics*. doi.org/10.1016/j.jfineco.2004.01.005

Lesmond, D. A., Ogden, J. P., & Trzcinka, C. A. (1999). A New Estimate of Transaction Costs. *Review of Financial Studies*. doi.org/10.1093/rfs/12.5.1113

Lin, J.-C., Singh, A. K., & Yu, W. (2009). Stock splits, trading continuity, and the cost of equity capital. *Journal of Financial Economics.* doi.org/10.1016/j.jfineco.2008.09.008

Lipson, M. L., & Mortal, S. (2009). Liquidity and Capital Structure. *SSRN Electronic Journal.* doi.org/10.2139/ssrn.887413

Liu, W. (2006). A liquidity-augmented capital asset pricing model. *Journal of Financial Economics*. doi.org/10.1016/j.jfineco.2005.10.001

Lou, X., & Shu, T. (2017). Price Impact or Trading Volume: Why Is the Amihud (2002) Measure Priced? *The Review of Financial Studies*. doi.org/10.1093/rfs/hhx072

Loukil, N., Zayani, M. B., & Omri, A. (2010). Impact of liquidity on stock returns: an empirical investigation of the Tunisian stock market. *Macroeconomics and Finance in Emerging Market Economies*. doi.org/10.1080/17520843.2010.498137

Lundblad, C. (2007). The risk return tradeoff in the long run: 1836–2003. *Journal of Financial*

Economics. doi.org/10.1016/j.jfineco.2006.06.003

Marshall, B.R., Young, M.R., (2003). Liquidity and stock returns in pure order-driven markets: evidence from the Australian stock market. *International Review of Financial Analysis*. doi.org/10.1016/S1057-5219(03)00006-1

Mulyana, D. (2011). Analisis Likuiditas Saham Serta Pengaruhnya Terhadap Harga Saham pada Perusahaan yang Berada Pada Indeks LQ45 Bursa Efek Indonesia. *Jurnal Magister Manajemen.*

Muslim, A.I.; Setiawan, D. (2021). Information Asymmetry, Ownership Structure and Cost of Equity Capital: The Formation for Open Innovation. *Journal of Open Innovation.* doi.org/10.3390/joitmc7010048

Naik, P., & Reddy Y. V. (2021). Stock Market Liquidity: A Literature Review. *Sage Open*. doi.org/10.1177/2158244020985529

Nguyen, N. H., & Lo, K. H. (2013). Asset returns and liquidity effects: Evidence from a developed but small market. *Pacific-Basin Finance Journal*. doi.org/10.1016/j.pacfin.2012.05.002

O'Hara, M. (2003). Presidential Address: Liquidity and Price Discovery. *The Journal of Finance.* doi.org/10.1111/1540-6261.00569

Ohlson, J. A., & Juettner-Nauroth, B. E. (2005). Expected EPS and EPS Growth as Determinants Of Value. *Review of Accounting Studies*. doi.org/10.1007/s11142-005-1535-3

Pastor, L., Sinha, M., & Swaminathan, B. (2008). Estimating the Intertemporal Risk–Return Tradeoff Using the Implied Cost of Capital. *The Journal of Finance*. doi.org/10.1111/j.1540-6261.2008.01415.x

Paton, A. P., Cannavan, D., Gray, S., & Hoang, K. (2020). Analyst versus model-based earnings forecasts: implied cost of capital applications. *Accounting & Finance*. doi.org/10.1111/acfi.12548

Ren, L., Liu, J., & Hao, Q. (2023). How digital transformation affects the cost of equity capital: the role of information disclosure quality and stock liquidity. *Industrial and Corporate Change*. doi.org/10.1093/icc/dtad053

Roll, R. (1984). A Simple Implicit Measure of the Effective Bid-Ask Spread in an Efficient Market. *The Journal of Finance*. doi.org/10.1111/j.1540-6261.1984.tb03897.x

Saad, M., & Samet, A. (2017). Liquidity and the implied cost of equity capital. *Journal of International Financial Markets, Institutions and Money*. doi.org/10.1016/j.intfin.2017.08.007

Ross, Westerfield, & Jordan. (2019). *Fundamentals of Corporate Finance.* McGraw Hill Education.

Tessema, A. M., Garas, S., & Tee, K. (2017). The impact of Islamic accounting standards on information asymmetry. *International Journal of Islamic and Middle Eastern Finance and Management*. doi.org/10.1108/IMEFM-09-2016-0129

Udomsirikul, P., Jumreornvong, S., & Jiraporn, P. (2011). Liquidity and capital structure: The case of Thailand. *Journal of Multinational Financial Management.* doi.org/10.1016/j.mulfin.2010.12.008