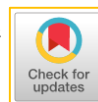


Analysis of stock liquidity in banking development: Evidence from Bank Jago



Adhelia Shury Ayunda ^{a,1,*}, Vidya Purnamasari ^{a,2}

^aDepartment of Economic Development, Faculty of Economic and Business, State University of Malang, Indonesia

¹adheliaayunda6@gmail.com*; ²vidya.purnamasari.fe@um.ac.id

* corresponding author

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ABSTRACT

This study is based on the development of digital banks that have begun to increase along with the emergence of many digital banks and the increase in the value of digital bank transactions since the Covid-19 pandemic in Indonesia. One of the digital banks that has become a pioneer of success is Bank Jago with the highest market capitalization value of other digital banks. This study aims to determine the growth pattern of Bank Jago's success which causes several factors to influence stock liquidity, namely company value, stock trading volume and stock trading frequency. The analysis method used is VECM (Vector Error Correction Model), a statistical technique that captures both short-term and long-term dynamics in a system of variables, making it particularly suitable for studying stock liquidity. The data used is monthly data with a time span from January 2020 to December 2023. The results of the VECM estimation test show that the variables of company value, stock trading volume and stock trading frequency have an effect on stock liquidity in the long-run due to the emergence of speculation that digital banks have positive prospects during the Covid-19 pandemic which caused an increase in Bank Jago shares from various aspects and had no effect in the short term due to a decline in investor views and company performance in the period at the end of 2022. The dynamic pattern between variables only occurs in quarters 1 to 5. In addition, shocks to the stock liquidity variables, company value and stock trading volume resulted in increasingly negative frequencies in stock liquidity. However, shocks to stock trading frequency have a positive effect on stock liquidity. The results of this study can be used to formulate strategies to increase stock liquidity at Bank Jago and can be implemented in other digital banks.

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1. Introduction

Digital transformation is an important phenomenon has an impact on almost all aspects of life in the era of globalization. The presence of digital transformation demands changes in business activities, and the company must consider consumer needs and business competition to develop efficient technology systems in digital form (Osmondson et al., 2018). Digital transformation has an impact on every activity in various sectors, including health, education, and the economy, and the banking industry is no exception. The banking sector is affected by digital transformation, where people expect faster access to financial services and products (Buwono et al., 2022). The current innovation in the banking industry is digital banks that offer services and conduct business through electronic channels with only one head office or a small number of physical locations (Prasetyo, 2018).

The development of digital banks in Indonesia has shown a positive trend from the previous year, as indicated by the value of digital bank transactions and the market capitalization value of digital

banks and motivated by the global liberalisation of financial systems. [Samarasinghe \(2023\)](#) argued diversification channels suggest stock market liquidity increases, banks diversify into other non-traditional activities and led to increase bank's stability. According to [Figure 1](#) on left side the value of digital bank transactions in 2023 increased by 13.48% or IDR 58478,24 trillion. Meanwhile, on right side, the market capitalization value of digital banks has a positive trend, with the highest value in 2023 being IDR 39781,28 million owned by Bank Jago.

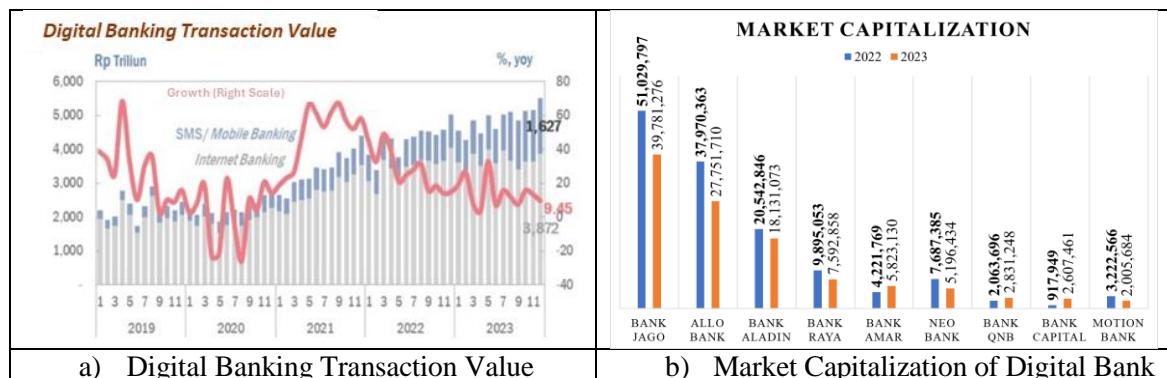


Figure 1. Digital Transaction Value and Market Capitalization of Digital Bank.

[Figure 1](#) shows Bank Jago has performed exceptionally well and continues transforming from an institution with only a banking license to a bank entirely operating based on technology. In the last two years, Bank Jago has consistently posted a positive net profit of 72.4 billion, making it one of the fastest technology-based banks to achieve profitability. The growth and improvement of Bank Jago have led to an increase in its liquidity and market capitalization so that Bank Jago is indexed in LQ45 from 2020 to 2023 ([Bursa Efek Indonesia, 2024](#)). The LQ45 index can use stock liquidity as one of its classification criteria. The more liquid a stock is, the more often it is exchanged, and the more investors are interested in transaction. Companies with high stock liquidity can show investors how effectively the company manages its performance and how promising its future ([Natsir et al., 2023](#)). Therefore, other external and internal factors can also affect stock liquidity, so it must be improved to maintain stable performance, maintain company value, and stay ahead of industry competition.

[Stereńczak & Kubiak \(2023\)](#) states company size and book value are two variables that may affect stock market liquidity, which as a result investors will pay more attention to high book values when making investments. The importance of stock market liquidity revealed from [Butler & Grullon \(2005\)](#) argued that banking performance can reduce the cost of raising capital by improving the market liquidity of their stock. [Dang et al \(2019\)](#) states that banks with higher stock market liquidity tend to have lower leverage. Moreover [Nnakee et al \(2025\)](#) found that stock market liquidity drives economic growth if supported by the right policy. During the crisis, stock market liquidity has vulnerabilities ([Smales, 2024](#)). [Khoirayanti & Sulistiyo \(2020\)](#) stated stock prices are determined by market participants and are determined by supply and demand in the market. Large market power causes stock market liquidity fluctuations to be more volatile. [Putra & Gunadi \(2023\)](#) argued successful a company is in building value for its investors, the more likely the value of the company will be balanced with the amount of capital issued.

Study on stock market liquidity is important. some studies analyze macroeconomic factors such as [Al Shehab \(2024\)](#) states that macroeconomic conditions become environment that plays an important role in stock market liquidity fluctuations. [Andani & Kurniawan \(2024\)](#) states the implementation of macroeconomic variables on stock market liquidity model as an illustration for investors in making decisions. Theoretically suggests that there is a short and long run relationship between macroeconomic variables and stock market liquidity ([Frimpong et al., 2024](#)). However, research on internal variables affects on stock market liquidity has advantages such as knowing trading volume and investor activity ([Messaoud et al., 2023](#)), market structure and trading mechanism ([Chung & Chuwonganant, 2023](#)), and company's financial performance ([Monga et al., 2023](#)). Overall, internal variables are important as they relate directly to how stocks are traded and how the market functions.

The size of stock trading indicates market fluctuations that investors can observe and trading activity indicated by the TVA or Trading Volume Activity as indicators. Higher stock prices appear to relax a firm's budget constraint, enlarging its investment set ([Khanna & Sonti, 2004](#)), and more stock traded means the value of the company goes higher. [Husnan \(2012\)](#) argued the primary motivation for investors to invest in the stock market is to obtain returns, which can come in the form

of dividends, capital gains, or ownership in a company. Before making an investment, investors assess the potential returns they expect from the stock and the overall value of the company. Stock prices reflect the corporate value of publicly traded companies, meaning that a higher stock price indicates a higher value for the company and maximum corporate value will result in increasing profit for shareholders.

The contribution of the study to the literature as follows: First, analyze internal factors and apply them to dynamic time-series data to determine the influence of internal variables in the short and long-run. Second, not only short and long-run estimates but analyze the response of internal factor shocks to stock liquidity and third case study on Bank Jago which shows a high capitalization value in the stock market, thus producing an in-depth analysis that can be used by other industries that are listed on the stock exchange. The shocks that affect financial constraints do not necessarily have to be macroeconomic or exogenous, financial constraints can also be affected by what happens to a firm's stock price (Suhadak et al., 2019). More shares traded on the stock exchange can bring stability to banks and expand investment opportunities for banks.

2. Method

This study used quantitative data. Bank Jago is one of the digital banks in Indonesia and started listing on the stock exchange in 2019 and has collaborations with various platforms from e-commerce, transportation service provider applications, travel industry, online shops, entertainment, to digital payments and fintech lending. This study was conducted from January 2020 to December 2023. The sources of data combined from the official websites of Bank Jago and the Indonesia Stock Exchange (www.idx.co.id). The Bank Jago website has equity data from the 2020–2023 monthly financial statements. Meanwhile, the Indonesia Stock Exchange website provides data on stock trading volume, number of shares outstanding, trading frequency, and daily stock prices. Daily data received from January 2020 to December 2023 is used to calculate the average value for each month. The developed model adopts research from Aminarta & Kurniawan (2021) and the equation as follows:

$$Y_t = A_0 + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

Where Y_t is a vector with size $(nx1)$ in which there are variables in the form of VAR, A_0 is an intercept vector with size $(nx1)$, A_1 to A_p is a coefficient matrix with size (nxn) at values 1 to $p = 1, 2, 3$ etc. and ε_t is an error vector with size $(nx1)$. The VECM model can apply structural analysis consisting of impulse response function (IRF) and Forecast Error Variance Decomposition (FEVD). VECM makes it possible to analyze and understand the causal relationship between variables in a dynamic system (Kadiri et al., 2024). In addition, the application of the cointegration model is applied to obtain estimates in the short and long-run (Agustina & Kurniawan, 2023). The specific models as follows:

$$Y_t = \beta_{11} + \beta_{12} \begin{bmatrix} Y \\ \mu \end{bmatrix} LnY_{t-1} + \sum_{i=1}^n \varphi_{11i} \Delta LnY_{t-1} + \sum_{j=1}^m \varphi_{12j} \Delta LnX1_{t-1} + \sum_{k=1}^q \varphi_{13k} \Delta LnX3_{t-1} + \varepsilon_t \quad (2)$$

Where Y_t is the stock liquidity; $X1$ is company value; $X2$ is the stock trading volume; and $X3$ is the stock trading frequency. The strong point for VECM estimation are the coefficient of the error correction term (θECM_{t-1}) and advantages of using the VECM method taking into account adjustment to long-term equilibrium (Wicaksana & Widodo, 2024). Using the error correction model for measure the speed of adjustment. In VECM, $Y, X1 - X3$ are assumed as endogenous in order to establish the short and long-run relation. β_{12} is unrestricted intercept; $\sum_{i=1}^n \varphi_{11i} - \sum_{n=1}^q \varphi_{16n}$ are the matrix of coefficient measuring for short-run estimation; γ present and the matrix coefficient of long-run coefficient; μ is the restricted intercept in the cointegration vector in the model; ε_t is the error term. Monthly time series data produces fluctuating data so it needs stationary test and with time series data, the first step is to conduct a stationary test which aims to identify the unit root problem in the variables used in the model.

3. Results and Discussion

The Augmented Dickey Fuller (ADF) test can identify the presence of unit roots in time series data, which indicates whether the data contains trends or is non-stationary. Knowing this can determine whether differencing or other transformations are needed to make the data stationary (He, 2018). Table 1 shows that the company value variable is stationary at the level because the probability value of ADF is smaller than alpha 5%. The other variables used in the study not significant on level. All variables stationery on first difference and means no unit root problem exists for all variables used in the study.

Table 1. Result of Stationery Test

Variables	Notation	ADF on Level	ADF on First Difference
Stock Liquidity	Y	0.088	0.000
Company Value	X1	0.037	0.000
Stock Trading Volume	X2	0.078	0.000
Stock Trading Frequency	X3	0.370	0.000

Source: data processed

The main advantage of the Johansen test over other cointegration tests is its ability to test more than two variables at once. It allows for more complex and comprehensive analysis in multivariable models, where we can examine cointegration between more than two variables in a single system (Agustina & Kurniawan, 2023). Table 2 shows there is cointegration between all variables used in the study and indicates that model has a long-term equilibrium.

Table 2. Result of Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob
None*	0.424	48.991	47.856	0.039
At Most 1	0.312	23.623	29.797	0.217
At Most 2	0.082	6.391	15.495	0.649
At Most 3	0.052	2.445	3.841	0.118

Source: data processed

The granger causality test is applied to analyze the causal relationship between the variables used in the model. In economic analysis, the Granger causality test can be used to evaluate the interaction between various economic indicators (Yasmin & Sari, 2024). Table 3 shows that there is no causality relationship between the variables used in the model, which can be caused by choosing the best lag in the VECM model using lag 1.

Table 3. Result of Granger Causality Test.

Hypothesis	F-statistics	Prob
Company Value to Stock Liquidity	0.038	0.847
Stock Liquidity to Company Value	1.298	0.261
Trading Volume to Stock Liquidity	0.229	0.635
Stock Liquidity to Trading Volume	0.018	0.893
Trading Frequency to Stock Liquidity	0.034	0.855
Stock Liquidity to Trading Frequency	0.006	0.998
Trading Volume to Company Value	0.523	0.473
Company Value to Trading Volume	0.248	0.689
Trading Frequency to Company Value	0.162	0.673
Company Value to Trading Frequency	0.180	0.673
Trading Frequency to Trading Volume	0.951	0.335
Trading Volume to Trading Frequency	0.354	0.555

Source: data processed

Table 4 shows company value, stock trading volume, and stock trading frequency significantly affects Bank Jago's stock liquidity in the long-run estimation. Digital banking emerged during the Covid-19 pandemic, which were seen by investors as having prospects compared to large banks whose financial ratios were much better. Bank Jago is one of the banks that transformed into a digital bank that took advantage of this momentum. The high interest of investors and Bank Jago users has increased the bank's profitability level significantly, accompanied by an increase in stock prices in

2021, which reached a stock capitalization level of up to IDR 241 trillion. The skyrocketing stock price has allowed Bank Jago to meet the value for its shareholders, which ultimately increases the assessment of potential investors. The increase in stock prices has caused the stock trading volume to rise, with the high frequency of stock trading.

The finding in line with [Norvaišienė & Stankevičienė \(2014\)](#) states that companies with higher book values show a higher level of stock liquidity because the stocks are liquid. [Le & Gregoriou \(2020\)](#) states that the level of stock liquidity can increase along with the increase in trading volume relative to the number of shares outstanding. [Ammar et al \(2020\)](#) states that High-Frequency Trading (HFT) can determine intraday patterns observed in stock liquidity. This study's results follow the signal theory, where high company value, stock trading volume, and stock trading frequency in the long-run will provide an excellent signal to prospective investors when making decisions when buying shares. This is based on the market microstructure theory, which states that stock prices can be formed by looking at the quality of the market, namely stock liquidity. High stock liquidity in the long-run will make prospective investors confident in investing in a company. Therefore, the growth in value, volume, and frequency of Bank Jago shares in the long run can be associated with a high level of liquidity, as it reflects the company's positive prospects and value.

Table 4. The Result of Regression Model.

Variables	Coefficient
Long-run Estimation	
Stock Liquidity (-1)	1.000
Company Value	-0.0004 (-4.775)***
Stock Trading Volume (-1)	-13.267 (-5.034)***
Stock Trading Frequency (-1)	1.50E-06 (3.191)***
Cons	-3.41E-05
Short-run Estimation	
CointEq 1	-0.053 (-0.503)
Δ Stock Liquidity (-1)	-0.152 (-0.907)
Δ Company Value (-1)	3.62E-05 (0.635)
Δ Stock Trading Volume (-1)	0.644 (0.428)
Δ Stock Trading Frequency (-1)	-2.17E-07 (-0.570)
Cons	2.48E-05 (2.480)

Source: data processed

For the short-run estimation based on [Table 4](#) shows company value, stock trading volume, and stock trading frequency significantly influence Bank Jago's stock liquidity in the short term. Although the COVID-19 pandemic has had a positive impact on increasing Bank Jago's company value in the long term, in the short term, the company value, stock trading volume, and stock trading frequency do not affect Stock Liquidity. This is due to the decline in Bank Jago's stock price as the Covid-19 pandemic ends. Company value can be reflected in the public's assessment of the company's performance. However, Bank Jago has shown resilience in the face of increasing operational and financial burdens. In the first quarter of 2023, Bank Jago's net profit fell to IDR 17.50 billion and, over time, increased insignificantly. This is also reinforced by the decline in speculation circulating regarding the success of digital banks in the future. In addition, Bank Jago's stock performance has decreased but not significantly. In December 2023, Bank Jago shares were still frequently traded with a value of 48.516.811 with a frequency of 16.340, even though it had decreased from the previous month. The number of shares traded that month was still higher than in early January 2023, at 19.427.014.

Based on the signal theory, the company's value, stock trading volume, and low stock trading frequency tend to signal potential investors wrong in buying shares. Based on the Market Microstructure, market conditions with stock liquidity do not reflect the market quality related to stock trading. Utami & Gumanti (2019) states that in the short term, other variables that affect the company's ability to meet short-term obligations and convert assets into cash include trading volume, spread level, information flow, number of shareholders, number of shares outstanding, transaction costs, and stock prices. Taslim & Wijayanto (2016) states stock trading volume does not significantly affect liquidity because low trading volume cannot considerably affect stock price movements. The results of this study are also in line with Yusra (2019) which states that trading frequency has no effect on the level of stock liquidity for investors based on the investments they make. Without the trading frequency factor, companies can still make money from sales and other sources of income. Therefore, investors must analyze the conditions that prove that high company value, stock trading volume, and stock trading frequency cannot guarantee an increase in a company's stock liquidity. Stock liquidity shows the extent to which investors see the value of profit in it, and high trading frequency in a company indicates that its shares are traded regularly, thus reducing the duration of investors holding the shares.

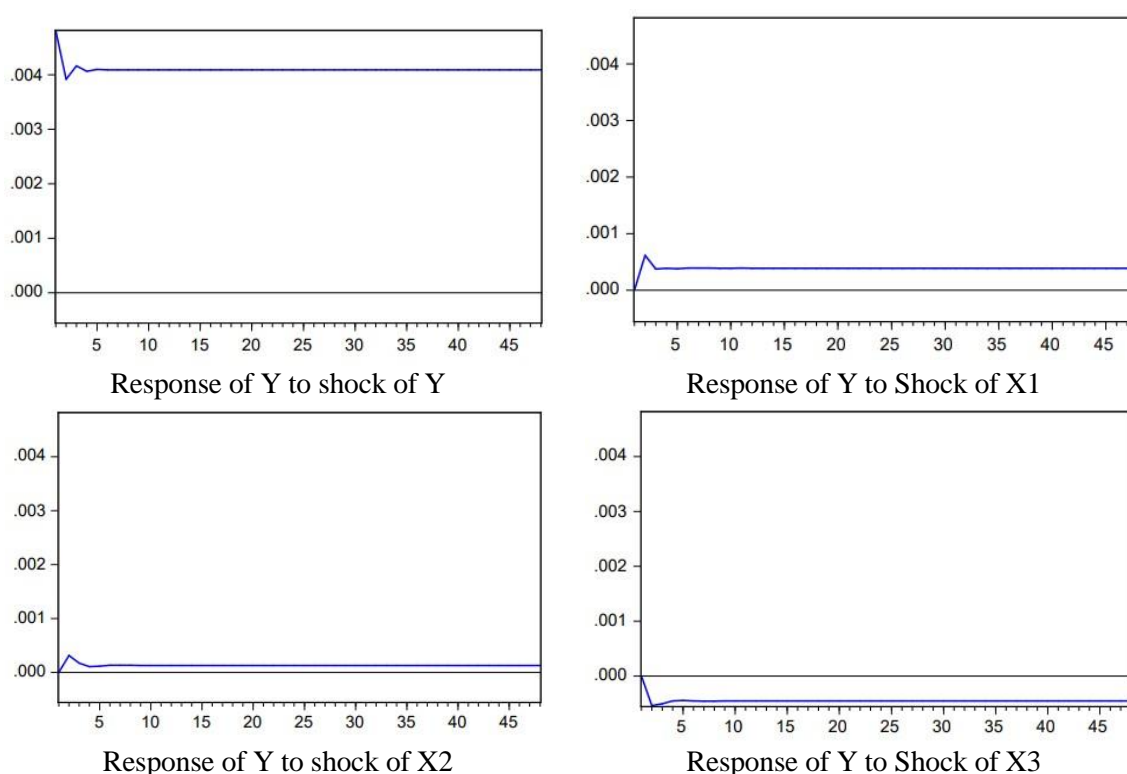


Figure 2. The Impulse Response Function (IRF)

Figure 2 shows the stock liquidity response to shocks from itself at the beginning of the quarter to the 5th quarter still fluctuates (up and down). Furthermore, after the 5th quarter, stock liquidity is no longer volatile like the previous quarter. The stock liquidity response to shocks from the company's value fluctuated in quarters 1 to 3. However, it was stable after the 3rd quarter, so stock liquidity did not fluctuate due to company value shocks. The stock liquidity response to shocks from stock trading volume occurred in quarters 1 to 5 and then stabilized until the 10th quarter. In contrast to the stock liquidity response in the previous variable, shocks from stock trading frequency tend to be negative. It means that if there is a shock of 1 standard deviation from the stock trading frequency, stock liquidity will react negatively to the stock trading frequency.

4. Conclusion

The presence of digital transformation demands changes in business activities, and the company must consider consumer needs and business competition to develop efficient technology systems in digital form. The development of digital banks in Indonesia has shown a positive trend from the previous year, as indicated by the value of digital bank transactions and the market capitalization value of digital banks and motivated by the global liberalisation of financial systems. Bank Jago is one of

the digital banks in Indonesia and started listing on the stock exchange in 2019 and has collaborations with various platforms from e-commerce, transportation service provider applications, travel industry, online shops, entertainment, to digital payments and fintech lending. The shocks that affect financial constraints do not necessarily have to be macroeconomic or exogenous, financial constraints can also be affected by what happens to a firm's stock price.

The result of VECM estimation provide company value, stock trading volume, and stock trading frequency significantly affect stock liquidity in the long term due to the emergence of speculation that digital banks have positive prospects during the COVID-19 pandemic, which caused an increase in Bank Jago shares from various aspects. Company value, stock trading volume, and stock trading frequency do not affect stock liquidity in the short term due to a decline in investor views and company performance in the final period of 2022. Dynamic patterns between variables only occur in quarters 1 to 5. In addition, shocks to stock liquidity variables, company value, and stock trading volume result in increasingly adverse fluctuations in stock liquidity. However, stock trading frequency shocks result in positive stock liquidity fluctuations. The implication of the study the government needs to make policies that support the digital banking ecosystem and the need for supervision of banks that are listed on the stock exchange.

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