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Do Risk Disclosure and Firm Value Drive Indonesian Bank Stock Returns?

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Abstract

Investors are increasingly concerned about risk transparency and cybersecurity disclosure as the banking sector becomes more digitalized. The purpose of this study is to look at how firm value, required risk disclosure, and cyber risk disclosure affect stock returns in the Indonesian banking sector between 2022 and 2024. The study employs a quantitative method, analyzing panel data from the annual reports of all 47 Indonesian banks listed on the Indonesia Stock Exchange between 2022 and 2024 using panel regression and the Common Effect Model (CEM). Tobin's Q is used to measure firm value, while disclosure indices are used to measure mandatory and cyber risk disclosures. Content analysis of the annual reports from 47 Indonesian banks shows that firm value has a negative and significant effect on stock prices, while mandatory risk disclosure has a consistently significant effect on stock returns. Cyber risk disclosure has a favorable and large impact on stock performance. However, if control variables are included, they render the effect statistically insignificant. The findings confirm signaling theory, demonstrating that cyber risk disclosure delivers important information that influences stock returns for investors. In reality, these findings suggest that investors and bank executives should pay closer attention to the disclosure of cyber risks in the digital banking landscape.

Keywords: Firm Value; Risk Disclosure; Cyber Risk; Stock Return; Banking

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INTRODUCTION

The banking industry is a pillar of the national economy, acting as a financial intermediary to promote development and financial stability (Sparta & Aura, 2024). Banking, being a significant sector, is an appealing investment prospect for those looking to maximise profits through stock returns. Stock returns are an indicator of investment success because they show results compared to the risks taken (Harianja et al., 2022). Firm value is one factor impacting these returns, with favourable assessments of future performance often leading to improved confidence and higher return expectations (Zikri & Albeta, 2025). In addition to financial performance, investors are increasingly looking at the transparency of risk disclosure as a key factor in determining a company's sustainability and credibility.

To strengthen transparency and maintain financial system resilience, banks in Indonesia are required to implement risk management practices in accordance with Financial Services Authority (OJK) regulation No. 18/POJK.03/2016 to address potential global volatility. Compliance with these risk disclosure requirements: POJK No. 37/POJK.03/2019 mandates compliance with these risk disclosure requirements. Through POJK No. 37/POJK.03/2019. However, the era of digitalisation has increased transactions via QRIS, mobile banking, and BI-FAST (Bank Indonesia, 2025), bringing new consequences in the form of complex cyber risks (VelSicuro, 2025). Ransomware and phishing attacks targeting major institutions such as BSI, BRI, BCA, and Himbara (Alfarizi, 2023; Catriana & Arief, 2025; Dhanya, 2024; Triatmodjo & Usman, 2025). Although cyber risk management has been regulated under POJK No.11/POJK.03/2022, the disclosure of cyber-related risks remains largely voluntary and varies across companies, potentially creating information asymmetry for investors. Therefore, understanding whether cyber risk disclosure provides value-relevant information to investors has become increasingly important in the Indonesian banking sector, where digital transformation continues to expand while exposure to cyber threats is simultaneously increasing.

In this context, the contradictions in past study results highlight the importance of this investigation. Some studies revealed that firm value has a beneficial impact on stock returns (Zarefar & Armadani, 2024). While Andiyanto et al. (2025) discovered a negative effect, Apriyando & Mariana (2023) and Mujianti & Novitasari (2025) observed insignificant effects. Similarly, there are inconsistent findings on the risk disclosure variable, with some showing positive benefits (Syamni et al., 2024) and others showing no effect on stock returns (Cahyaningtyas et al., 2024; Nurfauziah & Mulyati, 2021). As shown in Table 1, changes in firm value (Tobin's Q) in the Indonesian banking sector between 2022 and 2024 were not consistently linked with stock returns, implying that investors may consider non-financial information, such as risk disclosures, when making investment decisions.

Table 1. Comparison of Tobin's Q and Stock Returns

Year	Average Tobin's Q Ratio for the banking sector	Stock returns for the banking sector
2022	1.26	-2%
2023	1.44	-3%
2024	1.11	20%

Source: Author's calculation (2026)

As presented in Table 1, the average Tobin's Q ratio fluctuated during the observation period. The average Tobin's Q increased from 1.26 in 2022 to 1.44 in 2023. However, in the same year, the average stock returns decreased from -2% to -3%. In contrast, from 2023 to 2024, the average Tobin's Q decreased from 1.44 to 1.11, but the average stock return increased from -3% to 20%. This finding suggests that changes in company value do not always align with stock returns. This pattern suggests that investors may consider additional information beyond firm value, including non-financial information such as risk disclosure, when making investment decisions.

The purpose of this study is to fill the gap in the literature by examining the influence of firm value, required risk disclosure, and especially cyber risk disclosure in the banking sector on the Indonesian Stock Exchange during 2022-2024. The novelty of this study is that it differentiates between mandatory and voluntary cyber risk disclosure. Cyber risk is classified as a part of operational risk according to OJK Regulation No. 11/POJK.03/2022 regarding the implementation of bank information technology. This is in line with OJK Regulation No. 37/POJK.03/2019 regarding the transparency of mandatory risk disclosures, including operational risks. But these restrictions do not require the publication of cyber risk information. Therefore, it can be said that cyber risk disclosure is voluntary. Voluntary cyber risk disclosure may serve as an additional signal to investors about a company's transparency, which in turn may boost investor confidence and stock returns. Therefore, this research is expected to contribute empirically to the literature, offer practical advice to investors in the analysis of digital risk, and be a resource for bank management to improve transparency and risk disclosure techniques.

LITERATURE REVIEW

Signalling Theory

Signalling theory, introduced by Spence (1973), serves as the primary foundation for explaining how firms, as parties with more complete information, seek to reduce information asymmetry by sending specific signals to investors and stakeholders (Tigran & Muchlis, 2024). This information is crucial because it serves as a basis for assessing the company's condition and reducing uncertainty before making investment decisions (Kurlat & Scheuer, 2021). In this context, companies convey signals through annual reports that present both financial and non-financial information, including corporate governance and risk management (Rosyid et al., 2022). This information is presented in a way that makes management more open and lessens the information gap. In this study, signalling theory provides a theoretical framework to explain how firm value, mandatory risk disclosure, and cyber risk disclosure serve as signals that investors use to evaluate a company's prospects and make investment decisions. Companies with high firm value Investors generally perceive companies with high firm value as having strong performance and positive growth prospects, which can potentially boost stock returns (Juliandini et al., 2026). Investors generally perceive companies with high firm value as having strong performance and positive growth prospects, which can potentially boost stock returns (Juliandini et al., 2026). Furthermore, risk disclosure is expected to enhance corporate transparency by providing more comprehensive information regarding the risk faced by the company and strengthen investor confidence in the company's ability to manage various risks (Fan & Zhu, 2026). Consequently, the signals conveyed through firm value and risk disclosure are expected to influence market perceptions, which will

subsequently be reflected in changes in stock returns. Consequently, we anticipate that the signals conveyed through firm value and risk disclosure will influence market perceptions, which will subsequently reflect changes in stock returns. These signals are expected to influence market perceptions, which will subsequently reflect changes in stock returns.

Stock Returns

Stock return refers to the rate of return on stocks or the yield generated from investment activity, particularly in stock instruments. Stock return is the remuneration that an investor receives for their investment decisions (Desmita & Sihombing, 2024). This stock return could take the form of capital gains or dividends. Capital gains are the positive difference between a stock's selling and buying prices, whereas dividends are the distribution of a company's profits to shareholders as part of its performance (Judith & Setiawan, 2025). According to Jogiyanto in Vera et al. (2023), stock returns are classified into two types: realized returns and expected returns. Realized returns are actual rates of return derived using historical data, allowing them to be used to evaluate previous performance and forecast future risks and possible returns. Meanwhile, expected returns are the rates of return that investors anticipate in the foreseeable future.

Investors closely monitor stock returns as they reflect the outcome of their investment decisions. The magnitude of stock returns is influenced not only by a company's financial performance but also by how investors interpret the information the company discloses to the market (Desmita & Sihombing, 2024). Information signalling positive prospects regarding a company's condition tends to boost investor sentiment and confidence, leading to more positive market reactions that may ultimately be reflected in stock returns (Li et al., 2023). Conversely, information that creates uncertainty or is perceived negatively can influence investment decisions because investors react differently to corporate disclosures under conditions of high information uncertainty, resulting in different stock return responses (Lee & Park, 2021). In this study, stock returns are viewed as a form of market response to information published by the company. Information regarding firm value, mandatory risk disclosure, and cyber risk disclosure serves as a basis for investors to assess a company's prospects. Therefore, changes in such information are expected to influence investor perceptions, which are subsequently reflected in changes to stock returns.

The Effect of Firm Value on Stock Returns

The firm's value reflected the public's opinion of its performance and future potential (Desmita & Sihombing, 2024). As a reflection of the firm's success, management attempts to establish and maintain a positive image of the company among stakeholders, particularly investors. An increase in firm value ultimately helps shareholders, as seen by rising stock prices and increased returns on investment (Apriyando & Mariana, 2023). Price to Book Value (PBV), Price to Earnings Ratio (PER), and Tobin's Q are all proxies for measuring firm value, each with their focus. The PBV ratio evaluates how much the market values a company's equity in comparison to its book value; the PER measures the ratio of stock price per share to net income per share; and Tobin's Q measures the ratio of market capitalization and total debt to total assets (Suseno et al., 2024). Tobin's Q was chosen as the key proxy for determining business value in this study since it incorporates market perspectives as well as accounting perspectives. As a result, Tobin's Q is

thought to be a more comprehensive measure of company value than PBV and PER.

Firm value is an indicator of how the market perceives a company's performance and prospects. The higher the enterprise value, the more optimistic investors are about the company's ability to generate profits and growth. A high enterprise value offers a positive signal to investors about the company's stability and future profitability. Several studies have demonstrated that firm value has a beneficial effect on stock returns because it expresses market expectations of a company's ability to generate value for investors (Setyawati & Nugroho, 2023). Higher firm value also signals stronger growth potential, which boosts investor confidence and promotes favorable market reactions, as seen by higher stock returns (Wahyudi, 2024). Meanwhile, Andiyanto et al. (2025) discovered that firm worth does not necessarily affect stock returns positively. When the market believes that stock prices have fully reflected the company's value, it limits the potential profits on stocks. Despite the contradictory empirical findings on the relationship between firm value and stock returns, signaling theory implies that firm value is still a significant signal that enables investors to assess the company's growth potential, which may influence predicted returns.

Based on the above explanation, the following hypothesis is proposed:

H1: Firm value has a positive effect on stock returns.

The Effect of Mandatory Risk Disclosure on Stock Returns

Mandatory risk disclosure refers to the disclosure of banking risks that have existed since the beginning of banking and before the advent of digitalisation. Under POJK No. 18/POJK.03/2016, the Financial Services Authority (OJK) requires risk management banks to provide their yearly reports. At least 12 types of risk that must be disclosed publicly. These include at least 12 types of risk that must be disclosed, including capital risk, risk management, leverage ratio risk, credit risk, market risk, interest rate risk in banking, liquidity risk, operational risk, legal risk, reputational risk, compliance risk, and corporate governance. To improve public transparency, firms include risk disclosure in their annual reports. This data is provided in a company's annual report to improve public openness (Darniaty & Murwaningsari, 2020). Furthermore, the primary purpose of risk disclosure and management is to provide financial statement consumers with accurate and transparent information regarding the risks encountered and the techniques employed to mitigate those risks (Rosyid et al., 2022). In uncertain conditions, mandatory risk disclosure promotes transparency and reduces information asymmetry for investors. This may reassure the market about the company's fundamentals and strengthen positive investor sentiment towards its stock.

Risk disclosure in annual reports is critical to reducing information uncertainty and stock market volatility (Düsterhöft et al., 2023). Transparency is a signal that builds investor confidence in the firm's performance and worth. Consistent with this, Nahar and Jahan (2021) discovered that precise risk disclosure in the banking industry improves financial stability and bank performance, which can then influence stock returns by increasing investor confidence. Furthermore, investors are more sensitive to risk information in times of high uncertainty, and total risk disclosure has been shown to affect returns (Syamni et al., 2024). The obligatory risk disclosure serves as a positive indicator that management can effectively handle traditional banking risks. However, Arikan (2022) claimed that significant risk disclosures might lead to increased perceptions of firm risk among investors, thereby reducing their willingness to invest and causing negative market reactions.

These contrasting findings show that the impact of required risk disclosure is determined by the quality of the information given and how investors interpret it. However, according to signaling theory, mandatory risk disclosure is a positive signal that can boost stock returns by instilling confidence in investors. Based on the above discussion, the following hypothesis is proposed:
H2: Mandatory risk disclosure has a positive effect on stock returns.

The Effect of Cyber Risk Disclosure on Stock Returns

Cyber risk is a risk associated with the use of digital technology in a company's operations, including threats to its information technology systems, data, and networks that could harm business operations and potentially disrupt the economy (Alfi et al., 2023). The disclosure of cyber hazards is intended to assess a company's readiness to face threats originating from technological improvements (Sari et al., 2023). Disclosure of cyber risk and mitigation measures can boost investor confidence by demonstrating the company's readiness to solve difficulties in the digital realm. Sari et al. (2023) identified at least 16 indicators of cyber risk disclosure, including cyber risk identification, IT-related business models, IT as a strategic issue, IT capabilities as opportunities, cyber assets as valuable assets, cyber assets as intangible assets, information and cybersecurity policies, risk communication with stakeholders, insurance/cybersecurity insurance, company IT-related expenditures, and the capacity of the IT risk management committee.

Elsayed et al. (2024) discovered that banks' disclosure of cyber threats has a considerable favorable impact on their performance. The study's findings support the idea that transparency regarding cyber risk can boost investor confidence by demonstrating a bank's preparedness and capacity to deal with digital threats, which can impact stock returns. Meanwhile, Alsadoun and Albaz (2025) found that cyber risk disclosure and information security governance improve business value and reduce stock return volatility. The findings show that the higher the quality of cyber risk disclosure, the more confident investors are in the company's ability to survive in the digital banking era. According to signaling theory, cyber risk disclosure is a signal of digital credibility as well as the company's readiness to tackle current technology dangers. Companies that openly reveal their approach to managing cyber risk should expect more positive market reactions. However, Haapamäki and Sihvonen (2026) discovered that cyber risk disclosure does not always elicit substantial market reactions because investors do not prioritize cybersecurity information when making decisions. Furthermore, Arikan (2022) suggests that investors may interpret more precise risk disclosures as indicators of greater uncertainty, leading to unfavorable market reactions. Thus, the impact of cybersecurity disclosure may vary depending on the firm's ability to combat cyber risks and the investor's assessment. However, the empirical evidence from this research is mixed, and signaling theory suggests that cyber risk disclosure remains a positive signal of a company's transparency and can increase investor trust. Based on the above discussion, the following hypothesis is formulated:
H3: Cyber risk disclosure has a positive effect on stock returns.

Figure 1 illustrates the conceptual framework developed in this study based on signalling theory and the proposed research hypotheses.

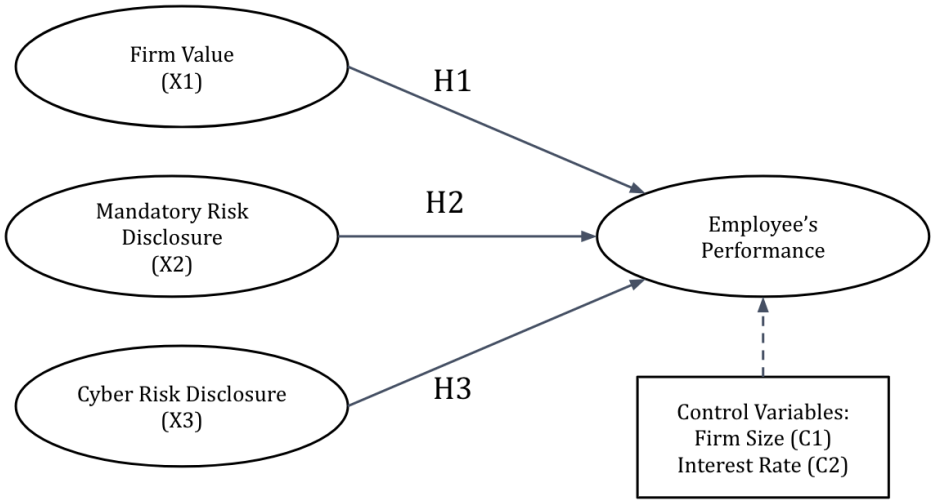


Figure 1. Conceptual Framework

As shown in Figure 1, firm value, mandatory risk disclosure, and cyber risk disclosure are proposed as independent variables influencing stock returns. The framework assumes that information conveyed through these variables serves as signals to investors and may affect market responses reflected in stock returns. Accordingly, three hypotheses are formulated to examine the direction and significance of these relationships.

Based on the conceptual framework and hypothesis development, this study employs the following panel data regression model:

$$Y_{it} = \alpha + \beta_1 X1_{it} + \beta_2 X2_{it} + \beta_3 X3_{it} + \beta_4 C1_{it} + \beta_5 C2_{t} + e_{it}$$

Where:

Yit	= Stock returns for firm *i* in period t
α	= Constant
$\beta_1, \beta_2, \beta_3$	= Regression coefficients
β_4, β_5	= Regression coefficients of control variables
X1it	= Firm value for firm *i* in period t
X2it	= Mandatory risk disclosure for firm *i* in period t
X3it	= Cyber risk disclosure for firm *i* in period t
C1it	= Firm size firm *i* in period t
C2it	= Interest rate in period t
eit	= Error term for firm *i* in period t

RESEARCH METHOD

This study employs a quantitative method using secondary data in the form of panel data, which combines time series and cross-sectional dimensions. Data were gathered from corporate annual reports, Statistics Indonesia (BPS), and Yahoo Finance for the years 2022-2024. This time period was chosen based on the post-pandemic economic recovery phase and the momentum of the implementation of POJK No. 11/POJK.03/2022 and SEOJK No. 29/SEOJK.03/2022 regarding cybersecurity. The study population included all 47 banking companies listed on the

Indonesia Stock Exchange (IDX) from 2022 to 2024. The sampling method employed was saturation sampling, which included every company in the sample. This study included 141 observations. All organizations have complete yearly reports, and the data required to assess all research variables is accessible from observations that were removed owing to missing values. Similarly, no stock trading suspensions occurred during the study period, resulting in the absence of share price data. Table 2 lists the banking companies included in the study sample. The sample includes all banking firms listed on the Indonesia Stock Exchange from 2022 to 2024.

Table 2. Research Sample List

No	Code	Name of the Company
1	AGRO	PT Bank Raya Indonesia Tbk
2	AGRS	PT Bank IBK Indonesia Tbk
3	AMAR	PT Bank Amar Indonesia Tbk
4	BABP	PT Bank MNC Internasional Tbk
5	BANK	PT Bank Aladin Syariah Tbk
6	BBKP	PT Bank KB Bukopin Tbk
7	BBMD	PT Bank Mestika Dharma Tbk
8	BBSI	PT Krom Bank Indonesia Tbk
9	BBYB	PT Bank Neo Commerce Tbk
10	BCIC	PT Bank Jtrust Indonesia Tbk
11	BEKS	PT Bank Pembangunan Daerah Banten
12	BGTG	PT Bank Ganesha Tbk
13	BINA	PT Bank Ina Perdana Tbk
14	BKSW	PT Bank QNB Indonesia Tbk
15	BNBA	PT Bank Bumi Arta Tbk
16	BSWD	PT Bank of India Indonesia Tbk
17	BVIC	PT Bank Victoria International Tbk
18	DNAR	PT Bank Oke Indonesia Tbk
19	INPC	PT Bank Artha Graha Internasional Tbk
20	MASB	PT Bank Multiarta Sentosa Tbk
21	NOBU	PT Bank Nationalnobu Tbk
22	PNBS	PT Bank Panin Dubai Syariah Tbk
23	ARTO	PT Bank Jago Tbk
24	BACA	PT Bank Capital Indonesia Tbk
25	BBHI	PT Allo Bank Indonesia Tbk
26	BJBR	PT Bank Pembangunan Daerah Jawa Barat dan Banten Tbk
27	BJTM	PT Bank Pembangunan Daerah Jawa Timur Tbk
28	BMAS	PT Bank Maspion Indonesia Tbk
29	BSIM	PT Bank Sinarmas Tbk
30	BTPS	PT Bank BTPN Syariah Tbk
31	MAYA	PT Bank Mayapada Internasional Tbk
32	MCOR	PT Bank China Construction Bank Indonesia Tbk
33	SDRA	PT Bank Woori Saudara Indonesia 1906 Tbk

No	Code	Name of the Company
34	BBTN	PT Bank Tabungan Negara (Persero) Tbk
35	BDMN	PT Bank Danamon Indonesia Tbk
36	BNGA	PT Bank CIMB Niaga Tbk
37	BNII	PT Bank Maybank Indonesia Tbk
38	BNLI	PT Bank Permata Tbk
39	BRIS	PT Bank Syariah Indonesia Tbk
40	BTPN	PT Bank SMBC Tbk
41	MEGA	PT Bank Mega Tbk
42	NISP	PT Bank OCBC NISP Tbk
43	PNBN	PT Bank Pan Indonesia Tbk
44	BBCA	PT Bank Central Asia Tbk
45	BBNI	PT Bank Negara Indonesia (Persero) Tbk
46	BBRI	PT Bank Rakyat Indonesia (Persero) Tbk
47	BMRI	PT Bank Mandiri (Persero) Tbk

As presented in Table 2, the research covers all 47 listed banking companies using a saturated sampling method. The use of the entire population enhances the representativeness of the finding and mitigates potential sample selection bias within the Indonesian banking sector. To empirically test the research model, the variables in this study are grouped into dependent (Y), independent (X), and control (C) variables. The operational definition, measurement indicators, and the references used are summarized in Table 3 below:

Table 3. Variable Measurement

Variables	Measurement	Scales	Sources
Stock returns (Y)	$Y_{it} = \frac{Closing\ price_t - Closing\ price_{t-1}}{Closing\ price_{t-1}}$	Ratio	(Andiyanto et al., 2025)
Firm value (X1)	$Tobin's\ Q_{it} = \frac{MVA+PS+Debt}{Total\ Assets}$ MVA: number of share outstanding x share price PS: Preferred stock	Ratio	(Apriyando & Mariana, 2023; Butt et al., 2021)
Mandatory risk disclosure (X2)	$RDI_{it} = \frac{\sum Disclosurescore}{Maximum\ score}$ Further explanation can be seen on Table 4	Ratio	(Elshandidy & Zeng, 2022)
Cyber risk disclosure (X3)	$RDI_{it} = \frac{\sum Item\ disclosure}{Total\ item}$ Further explanation can be seen on Table 5	Ratio	(Sari et al., 2023)
Firm size (C1)	Ln(Total Assets).	Ratio	(Atahau et al., 2025)
Interest rate (C2)	Average annual interest rate.	Ratio	(Kodri & Yudiana, 2024)

Table 3 summarises the operational definitions, measurement techniques, scales, and references for each variable. Tobin's Q is used to calculate firm value, while required and cyber risk disclosures are appraised using content-based disclosure indexes. In addition, company size and interest rate are incorporated as control variables to strengthen the research model. The mandatory risk disclosure is measured using the content analysis approach, which is based on the risk indicators specified by the Financial Services Authority (OJK) in No. 18/POJK.03/2016. Table 4 shows the necessary risk disclosure indicators and maximum scores used in this investigation.

Table 4. Mandatory Risk Disclosure Indicators

Indicator	Maximum Score
Capital risk	3
Risk management	3
Leverage ratio risk	3
Credit risk	3
Market risk	3
Internet rate risk in the banking book (IRRBB)	3
Liquidity risk	3
Operational risk	3
Legal risk	3
Reputational risk	3
Strategic risk	3
Compliance risk	3
Corporate governance	3
Total Maximum Score	39

Source: Elshandidy & Zeng (2022) ; POJK No.18/POJK.03/2016 (2016)

The 13 mandatory risk disclosure indicators used in this study are shown in Table 4. The maximum score for each indicator is 3, with the maximum overall score being 39. Each indicator is rated on a scale of 0-3 depending on the depth of information disclosed in the annual report. If the company does not report on the indicator being assessed, it receives a score of 0. If the company provides a general explanation of the risk, a score of 1 is given. 2. If the company explains the risk and its related impact, score 2 is given. A score of 3 is given if the company discloses the risk, the impact of the risk, and its risk management policy. The risk disclosure index is calculated by dividing the total score attained by the total maximum score. In addition, the indicator of cyber risk disclosures refers to the research of Sari et al. (2023). The indicators used in this study are presented in Table 5.

Table 5. Cyber Risk Disclosure Indicator

Indicator	Maximum Score
Identification of cyber risks	1
IT related business models	1
IT as a strategic issue	1

The power of IT as an opportunity	1
Cyber assets as valuable assets	1
Cyber assets as intangible assets	1
Information and cyber security policies	1
Risk communication with stakeholders	1
Insurance/cyber security insurance	1
Company IT-related expenditures	1
Capacity of the risk management committee	1
IT steering committee	1
IT governance	1
Information system planning	1
IT related management knowledge	1
IT risk management governance	1
Total Score	**16**

Source: (Sari et al., 2023)

The measures presented in Table 5 are the items used to assess the level of cyber risk disclosure by the corporation. The method of content analysis was used to assess cyber risk disclosure. For this method, the information about a disclosure item received a score of 1 if it was found in the company's annual report and a score of 0 if it was not found. The cyber risk disclosure index score was determined by dividing the number of items disclosed by the company. Consistency and objectivity were maintained by evaluating all annual reports against the same criteria from the list of established indicators. The analysis of risk disclosure was done using the content analysis method by identifying information contained in annual reports and then comparing it with the indicators. Panel data regression using STATA version 17 was used to analyze the data. The analysis steps involved a descriptive test and the selection of the best model (Chow test, Hausman test, and Lagrange multiplier) among CEM, FEM, and REM (Hamdani et al., 2025), along with diagnostic tests. Hypothesis testing was done by using a t-test, an F-test, and the coefficient of determination based on the research model developed in this study.

RESULT

Descriptive analysis was used to provide an overview of the distribution and characteristics of the research variables during the 2022–2024 period. Table 6 provides an overview of the descriptive statistics for all variables examined in this study.

Table 6. Descriptive Statistic Result

Variable	N	Min	Max	Mean	Std. Dev
Stock Returns	141	-0,68	4,52	0,503	0,508
Firm value	141	0,25	4,50	1,179	0,673
Mandatory risk disclosure	141	0,28	1,00	0,842	0,111
Cyber risk disclosure	141	0,43	0,938	0,821	0,091
Size	141	8,106	14702	10,841	1,674

Interest rate	141	0,04	0,061	0,53	0,009

Based on Table 6, the average stock return is 0.503 with a standard deviation of 0.508, indicating variations in stock performance among banks during the post-pandemic transition phase. Firm value, measured by Tobin's Q, shows an average of 1.179 (>1), indicating favourable growth prospects and market appreciation above the book value of assets. Mandatory risk disclosure has a high mean (0.842) with a low standard deviation (0.111), suggesting that conventional risk disclosure in the banking sector tends to be homogeneous due to strict regulatory requirements. The average for cyber risk disclosure is 0.821, which is slightly lower than the average for the mandatory risk variable. This indicates that, although it is voluntary, banks have recognised the importance of cyber transparency in line with the acceleration of digitalisation (QRIS and mobile banking). For a more detailed overview of cyber risk disclosure, Table 7 presents the average disclosure scores for each indicator.

Table 7. Cyber Risk Indicator Analysis

Indicator	Mean
Identification of cyber risks	0.957
IT related business models	0.992
IT as a strategic issue	0.992
The power of IT as an opportunity	0.929
Cyber assets as valuable assets	0.907
Cyber assets as intangible assets	0.191
Information and cyber security policies	0.978
Risk communication with stakeholders	0.751
Insurance/cyber security insurance	0.014
Company IT-related expenditures	0.978
Capacity of the risk management committee	0.985
IT steering committee	0.730
IT governance	0.872
Information system planning	0.978
IT related management knowledge	0.829
IT risk management governance	0.992

As shown on Table 7, the Indonesian banking sector has elevated cybersecurity risk to a strategic level and established robust governance frameworks. However, an intriguing finding emerged regarding the cybersecurity insurance indicator, which recorded the lowest score (0.014). This suggests that cybersecurity risk management remains heavily reliant on internal prevention measures rather than risk transfer mechanisms. This indicates that cyber insurance disclosure remains very limited, even following cyberattack incidents.

Several statistical tests were conducted to compare the cross-subject and cross-time characteristics to determine the best panel data regression model. The Chow test showed that the p-value was 0.0503 (>0.05), which led to the choice of the Common Effects Model (CEM) over the Fixed Effects Model (FEM). The Lagrange Multiplier Test, which yields a probability value of

1.000, also supports this finding, indicating that the CEM is still preferred over the Random Effects Model (REM). Thus, no significant individual or random effects were identified in the cross-sectional units, and the data were estimated with the CEM approach. A set of classical assumption tests was done to meet the criteria for the Best Linear Unbiased Estimator (BLUE) of the regression results. Regarding normality, the number of observations (141) fulfilled the Central Limit Theorem (CLT); hence, the distribution for the estimator was assumed to be close to normal. The multicollinearity test indicated that the model was free from multicollinearity problems among independent variables. In the multicollinearity test, the Variance Inflation Factor (VIF) values of all variables were less than 10, with an average VIF value of 1.52. The test results show that there is heteroscedasticity (Prob. 0.000) and autocorrelation (Prob. 0.003). In this study, these problems were solved by using a cluster-robust standard errors approach (VCE cluster ID). As MacKinnon et al. (2023) argue, a cluster-robust covariance estimator can be used to adjust the standard errors to be valid and correct even if the residual variance and the correlation between periods are not consistent. This guarantees the reliability of the significance tests in this study to draw the statistical conclusions. Table 8 summarizes the results of the panel data regression analysis with the CEM model to test the hypothesis and verify the robustness of the research.

Table 8. Hypothesis Testing Result

Variable	Model 1			Model 2		
	coef	t	P>|t|	coef	t	P>|t|
Firm value	-0.081	-2.16	0.036	-0.085	-2.15	0.037
Mandatory risk disclosure	0.534	1.13	0.265	0.565	1.33	0.190
Cyber risk disclosure	0.543	2.49	0.017	0.515	1.97	0.055
Size	-	-	-	-0.008	-0.46	0.650
Interest rate	-	-	-	1.478	0.46	0.644
Prop.>F	0.0023			0.0051		
R-Squared	0.0475			0.0488		

Table 8 presented hypothesis testing using Model 1 without a control variable and Model 2 with a control variable. Model 1 indicates a significant simultaneous effect (Prob > F = 0.0023) with an R-squared value of 4.75%. Partially, firm value has a significant negative effect on stock returns (P-value 0.036 < 0.05 and coefficient -0.081), so H1 is not supported. Conversely, mandatory risk disclosure has no significant effect (P-value 0.265 > 0.05), so H2 is not supported. Meanwhile, cyber risk disclosure has a significant positive effect (P-value 0.017 < 0.05 and coefficient 0.543), meaning increased cyber transparency drives an increase in stock returns, so H3 is supported.

A robustness assessment using Model 2 with the addition of control variables yields consistent results. Firm value remains significantly negative (P-value 0.037 < 0.05 and coefficient -0.085), and mandatory risk disclosure remains insignificant. Meanwhile, the effect of cyber risk disclosure weakened due to the intervention of the control variables, with a P-value of 0.055. However, the effect remained positive with a coefficient of 0.151. The control variables of firm size (P-value 0.650) and interest rate (P-value 0.644) were not found to have a statistically significant effect on stock returns during the study period.

DISCUSSION

The purpose of this study is to test the effect of firm value, mandatory risk disclosure, and cyber risk disclosure on stock returns in the banking sector in Indonesia. Based on the analysis, it was found that the firm value harms stock returns. This is in accordance with research conducted by Andiyanto et al. (2025). This result indicates that the high market valuation of banking assets (Tobin's Q>1) did not necessarily lead to higher stock returns over the period studied. One potential explanation is that investors may have viewed other factors beyond firm value in their evaluation of banking stocks, such as the uncertainties related to the post-pandemic economic recovery and the current digital transformation, and the macroeconomic issues facing Indonesia's financial sector (Ulani & Aprirachman, 2025). However, since this study does not directly investigate the investor sentiment, the asset quality, the credit restructuring policies, or other macroeconomic conditions, this interpretation should be taken with caution and deserves further investigation.

Mandatory risk disclosure was found to not affect stock returns, consistent with Nurfauziah & Mulyati (2021) but contradictory to Düsterhöft et al. (2023). One possible explanation is that mandatory risk disclosure may provide limited new information because these disclosures are standardized and required by regulation. Within the framework of signaling theory, information that is routine and strictly regulated under OJK regulation No. 37/POJK.03/2019 may lose its signaling information content because it has become an industry standard. In the Indonesian banking sector, all listed banks are required to disclose similar categories of operational, market, liquidity, and other principal risks in accordance with OJK regulations. As a result, the disclosed information tends to be relatively homogeneous across banks, providing limited additional information for investors when making investment decisions. Consequently, mandatory risk disclosure may contain limited incremental information for investors, reducing its ability to influence stock returns.

The disclosure of cyber risks contributes positively to stock returns, consistent with Alsadoun & Albaz (2025) and Elsayed et al. (2024). These findings are particularly relevant to the Indonesian banking sector, which experienced rapid digital transformation through the expansion of mobile banking, QRIS, and BI-FAST, alongside increasing cybersecurity threats, including several high-profile cyber incidents involving national banking institutions. Under these conditions, investors may place greater emphasis on information regarding banks' preparedness to manage cyber risks because cyber incidents can disrupt operations, damage reputation, and reduce public confidence. From a signalling theory perspective, transparency regarding cyber risks serves as a positive signal of management's preparedness to address digital threats, particularly following major cyberattack incidents in the banking sector. Management transparency regarding cyber readiness acts as a strong signal of quality, reducing information asymmetry between banks and investors. The findings suggest that investors may assign greater value to banks that explicitly communicate their strategies for mitigating cyber risks, as such disclosures may reduce information asymmetry regarding digital operational risks.

Theoretically, this study reinforces signalling theory by showing that cyber risk disclosure contains relevant and valuable information that influences stock returns, indicating its role as a signal for investors. For investors, the findings indicate that cyber risk disclosure should be factored

into investment decisions because of its beneficial impact on stock returns. For banking institutions, cyber risk disclosure should be positioned as a communication strategy to the market, supported by more specific disclosures such as cybersecurity infrastructure expenditures, data protection systems, incident response mechanisms, and cyber insurance to enhance investor confidence. Based on the research findings, firm value has a negative and significant effect on stock returns, indicating that the market-based components of Tobin's Q as a proxy may overlap with stock return measurements. Therefore, future research is recommended to use alternative measures of firm value such as BVPS, ROA, ROE, PER, or other proxies that better reflect the firm's fundamental performance. Additionally, the measurement of mandatory risk disclosure and cyber risk disclosure can be improved by using more detailed and structured indicators, as well as considering alternative measurement techniques to enhance the objectivity of the results.

CONCLUSION

This study suggests that stock return dynamics in the banking sector between 2022 and 2024 are influenced greatly by the quality of modern risk disclosure. Firm value was discovered to have a significant negative effect on stock returns, implying that higher market valuation did not always result in higher stock returns over the observation period. Meanwhile, mandated risk disclosure has no major impact because it is both mandatory and customary, implying that the market has already anticipated the information. In contrast, the empirical results confirm the signaling theory approach by indicating that cyber risk disclosure has a considerable positive effect. Transparency regarding this strategic risk acts as an indication of management trustworthiness, which can boost investor confidence. Overall, this analysis demonstrates that as digitalization accelerates, voluntary risk disclosure is more relevant than required disclosure in explaining stock return creation in the banking sector. However, the study's conclusions may be restricted in generalizability because the model does not account for all factors that drive bank stock returns.

LIMITATIONS

When interpreting the results, one should consider the several limitations of this study. First, the firm value is measured using Tobin's Q, which is based on market capitalization and creates an overlap with the dependent variable, namely stock returns. In addition, Tobin's Q may not fully capture all dimensions of firm value and performance, indicating that other aspects may be underrepresented in the research model. Second, cyber risk disclosure remains voluntary and lacks standardized reporting practices. Differences in reporting style, depth of information, and narrative interpretation across banks may lead to variations in the disclosure index assessment, thereby introducing potential subjectivity in the assessment process. Third, the measurement of risk disclosure using content analysis relies on the researcher's interpretation of information presented in annual reports. Although conducted systematically based on predefined indicators, this method has limitations in capturing the full contextual meaning of the disclosed information. Therefore, researchers should consider these limitations when interpreting and generalizing the findings of this study.

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