

The Moderating Role of Corporate Governance in the Relationship Between XBRL Adoption and Information Asymmetry: Evidence from Indonesian Technology Firms

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Abstract

This study examines the effect of Extensible Business Reporting Language (XBRL)-based financial reporting on information asymmetry and investigates whether corporate governance moderates this relationship. Although XBRL is widely promoted as a digital reporting mechanism that improves accessibility, comparability, and transparency, its effectiveness in emerging markets remains inconclusive. This study focuses on technology sector companies listed on the Indonesia Stock Exchange during 2020–2022. Using 63 firm-year observations from 21 companies, data were collected from annual reports, financial statements, stock trading data, and other public corporate information. The data were analyzed using moderated regression analysis. Contrary to the initial expectation, the findings show that XBRL adoption has a positive and significant effect on information asymmetry, measured by bid-ask spread. This indicates that XBRL adoption does not automatically reduce information asymmetry in Indonesian technology firms. The interaction between XBRL adoption and corporate governance is also positive and significant, suggesting that corporate governance strengthens the positive association between XBRL adoption and information asymmetry. These findings imply that digital reporting technology alone is insufficient to improve transparency without adequate investor capability, reporting quality, governance substance, and institutional enforcement.

Keywords : XBRL, Information Asymmetry, Bid-Ask Sprea, Corporate Governance, Technology Firms

1. Introduction

Digital financial reporting has become an important mechanism for improving the accessibility, comparability, and timeliness of corporate financial information. In capital markets, investors and other stakeholders increasingly rely on digital reporting systems to obtain financial data for decision-making. However, merely publishing financial statements through corporate websites or stock exchange platforms does not automatically improve the usefulness of financial information. Financial reports presented in PDF, Excel, or text-based formats often require users to manually download, re-enter, and process the data before analysis. This process may increase processing time, create input errors, and limit the ability of users to compare information across firms. These limitations may contribute to information asymmetry, particularly when investors do not have equal access to timely, accurate, and machine-readable financial information. The company's financial reports can be accessed by users globally and increase the timeliness of reporting (Gupta et al., 2023). Even so, the content presented on the publication web page will not be much different from the printed financial statements. The users will not get additional new information about the financial statements.

In the era of digital financial reporting, the use of XBRL (eXtensible Business Reporting Language) is one of the key innovations revolutionising the way corporate financial information is delivered (Alkayed et al., 2023). Extensible Business Reporting Language (XBRL) has been introduced as a digital reporting innovation designed to address these limitations. XBRL enables

financial information to be tagged, structured, and processed automatically by computer systems, thereby improving data accessibility, comparability, and analytical efficiency. In theory, XBRL can reduce information asymmetry by allowing investors and stakeholders to retrieve and analyse financial information more efficiently. Prior studies have shown that XBRL adoption may improve financial reporting quality, reduce information processing costs, and enhance market transparency (Cahan et al., 2022; Roohani et al., 2009). Nevertheless, empirical findings regarding the effectiveness of XBRL in reducing information asymmetry remain inconclusive. Some studies suggest that XBRL improves transparency and reduces information gaps, while others indicate that its benefits depend on firm-level characteristics, reporting quality, institutional environment, and monitoring mechanisms. However, while this technology offers many advantages, the adoption of XBRL across organisations shows varying degrees of success. To understand this phenomenon, Diffusion of Innovation Theory (DOI) introduced by (Rogers & Smith, 1962). This theory can be used as a theoretical framework to explain how, why and to what extent innovations such as XBRL are adopted in organisational contexts, particularly in financial reporting systems. (Rogers et al., 2014) argues this theory explains how innovations spread within a social system, and how individuals, firms or institutions adopt them over time. In an economic context, DOI is used to understand technology adoption, changes in market behavior, and the spread of new policies, such as technology-based financial reporting systems (e.g., XBRL). Although XBRL provides a standardized reporting infrastructure, its effectiveness depends on how firms use the technology and whether the reported information is supported by credible governance mechanisms. Firms may comply with digital reporting requirements formally, but weak monitoring may still allow incomplete, low-quality, or strategically presented information. Therefore, XBRL may reduce information asymmetry more effectively when it is supported by strong corporate governance. Corporate governance plays an important role in strengthening transparency, improving disclosure discipline, limiting managerial opportunism, and ensuring that financial information reflects the firm's actual economic condition. This study therefore argues that corporate governance does not merely have a direct effect on information asymmetry but also conditions the effectiveness of XBRL-based reporting in reducing information asymmetry.

The theoretical foundation of this study is based on Diffusion of Innovation Theory. According to Rogers' Diffusion of Innovation Theory, the adoption of an innovation is influenced by its perceived relative advantage, compatibility, complexity, trialability, and observability. XBRL represents a financial reporting innovation because it changes the way corporate information is prepared, transmitted, and consumed. Its relative advantage lies in its ability to improve automation, accessibility, and comparability of financial information. Its compatibility is reflected in the extent to which firms' internal reporting systems and governance structures support digital reporting practices. However, XBRL may also involve complexity because firms require adequate technological capability, reporting discipline, and organizational readiness to implement it effectively. From this perspective, corporate governance can be understood as an organizational mechanism that strengthens the diffusion and effective use of XBRL. Firms with stronger governance are more likely to implement XBRL not only as a regulatory requirement but also as a tool to improve reporting transparency and reduce information asymmetry. Companies see the strategic value of XBRL in improving transparency, accountability and reporting efficiency, and strengthening investor confidence. (Rogers et al., 2014) also identified five key characteristics of an innovation that influence its adoption rate: relative advantage, compatibility, complexity, trialability and observability. XBRL has a high relative advantage as it simplifies the reporting process, enables automation and improves data accessibility. However, on the other hand, the complexity of XBRL is also a barrier, especially for organisations that are not familiar with technology-based reporting systems (Ra & Lee, 2018).

(Singh & Singh, 2022) state that the increase in the number of users accessing financial reports digitally does not simplify the process of downloading and processing the data. Financial

report users must download the information in various formats such as PDF, excel, and textfile and re-enter the data before analyzing it. This of course makes the process of processing financial statement data longer and it is also difficult to avoid the risk of data input errors. Searching for information is also still done manually so that it often takes a long time and makes it possible for the information not to be found. Delays in data processing, inaccurate data, and incomplete information can affect the quality of published financial statements and the decisions of users of financial statements that can harm the company. These problems must of course be avoided by the company. Therefore, the XBRL (Extensible Business Report Language) format is presented as a solution to overcome the problems in processing and publishing digital financial statement data (Singh & Singh, 2022). Research on the use of XBRL in financial reporting systems is not only important, but urgent, as it covers technological, policy, economic and governance aspects. This research contributes to improving the quality and integrity of financial reporting, encouraging the efficiency of decision-making in financial markets, preparing the accounting world to welcome the digital reporting era more adaptively and intelligently so as to avoid information asymmetry by stakeholders.

The quality of good financial reporting certainly contains good information as well (Suryandari & Susandya, 2023). This condition will be used by investors to make decisions about a company. Quality financial information can reduce agency problems, namely information asymmetry (Altarawneh et al., 2022) and prevent fraud in financial reporting (Susandya et al., 2025). Ra & Lee (2018) argue that there is a fairly strong correlation between the application of XBRL usage and the level of company information asymmetry.

This study improves previous studies by adding corporate governance (CG) as a moderating variable to the relationship between the effect of XBRL implementation and the level of information asymmetry. The moderating variable is added because CG is one of the variables that directly affects the level of information asymmetry. Firms with good corporate governance principles assumed that they will have good quality financial statements. This is due to the good level of transparency of financial statements so that it will reduce the level of information asymmetry of the company. One of the advantages of implementing XBRL is that it can increase the transparency of financial statements, so that the adoption of the use of XBRL is in line with the principles of CG (Ragothaman, 2012). Therefore, in this study it is estimated that the effect of XBRL application on the level of information asymmetry of the company will be strengthened by CG, which means that the level of information asymmetry reduction will be greater for companies that have a good level of CG.

This study focuses on technology sector companies listed on the Indonesia Stock Exchange during the 2020–2022 period. The technology sector is a relevant setting for examining XBRL and information asymmetry for several reasons. First, technology firms are closely associated with digital innovation and are expected to have greater familiarity with technology-based systems, including digital financial reporting. Second, technology sector firms often rely heavily on intangible assets, innovation capability, growth opportunities, and market expectations, all of which may increase uncertainty and information asymmetry between managers and investors. Third, the technology sector experienced rapid development during the study period, making timely and transparent financial reporting particularly important for investors. Therefore, examining XBRL in this sector provides a meaningful context for understanding whether digital reporting mechanisms can reduce information gaps in firms with relatively high information uncertainty.

This study contributes to the literature in several ways. First, it extends research on XBRL-based financial reporting by examining its effect on information asymmetry in an emerging market context. Most prior studies have focused on developed markets or broader cross-sector samples, while evidence from emerging capital markets remains limited. Second, this study provides a more specific sectoral contribution by focusing on technology companies, where information asymmetry is particularly relevant due to the importance of intangible resources,

innovation, and growth expectations. Third, this study clarifies the moderating role of corporate governance by arguing that the benefits of XBRL depend not only on the adoption of technology but also on the quality of firm-level monitoring mechanisms. Thus, the novelty of this study lies not simply in adding corporate governance as a moderator, but in explaining how governance strengthens the effectiveness of XBRL in reducing information asymmetry within the technology sector of an emerging market.

Accordingly, this study aims to examine whether XBRL-based financial reporting reduces information asymmetry and whether corporate governance strengthens this relationship. The findings are expected to provide theoretical implications for the literature on digital financial reporting, information asymmetry, and corporate governance. Practically, this study provides insights for regulators, listed companies, and investors by showing that the effectiveness of XBRL depends not only on technological adoption but also on the quality of governance mechanisms that support transparent and credible financial reporting

2. Literature Review

The XBRL Implementation on Information Asymmetry

Information asymmetry occurs when one party, particularly corporate insiders, possesses more or better information than external stakeholders. In capital markets, this condition may reduce market efficiency because investors do not have equal access to relevant, timely, and comparable financial information. Financial reporting therefore plays an important role in reducing information gaps between managers and investors. However, traditional financial reporting formats, such as PDF, Excel, or text-based files, often limit the usefulness of financial information because users must manually collect, process, and compare data across firms. This process may increase information-processing costs and create barriers for less sophisticated investors.

Extensible Business Reporting Language (XBRL) is designed to overcome these limitations by presenting financial information in a standardized, machine-readable, and comparable format. XBRL allows financial data to be automatically extracted, processed, and analysed, thereby reducing the time and cost required to obtain relevant information. From an information asymmetry perspective, XBRL can reduce information gaps through three mechanisms. First, XBRL improves accessibility, because financial information becomes easier to retrieve and process by investors, analysts, and regulators. Second, XBRL improves comparability, because standardized tagging enables users to compare financial data across companies more efficiently. Third, XBRL improves timeliness and analytical efficiency, because users can process large amounts of financial information without excessive manual input.

Extensible Business Report Language (XBRL) is a new financial reporting standard based on information technology. Martinis et al. (2020) argue that the application of XBRL will provide benefits to users at all stages of business reporting and analysis. The benefits of XBRL to increase efficiency, speed and automation are seen in automation, cost savings, faster, more reliable and accurate data handling. Bartolacci et al. (2020; Saragih & Ali, 2024; Yi F & L, 2016) find that a better level of corporate disclosure will reduce information asymmetry in the capital market. The adoption of XBRL in corporate financial reporting will increase transparency and information quality. (Harahap, 2019) found that the adoption of XBRL can reduce information asymmetry. (Hoitash et al., 2021) argue that XBRL allows financial information to be presented in a standardized format, so that it can be easily understood and compared by various parties. This is crucial in reducing information asymmetry as all parties, both internal and external to the company, gain access to the same data, in a uniform format. Small investors who previously had less access to information than institutional investors can now access the same data in real-time. With faster and more accurate information, markets can react in a more efficient manner to corporate events or changes in financial conditions. A real-time market reaction reflects a

decrease in information asymmetry as all market participants have an equal opportunity to access and analyze data. Thus, the hypothesis is:

H1: XBRL adoption has a negative effect on information asymmetry

The Corporate Governance as a Moderating Effect of XBRL Implementation on Information Asymmetry

Although XBRL can improve the technical quality of financial reporting, its effectiveness in reducing information asymmetry depends on whether the information provided by firms is credible, complete, and timely. XBRL standardizes the way financial data are reported, but it does not directly control managerial incentives in preparing and disclosing information. Therefore, strong corporate governance is needed to ensure that the benefits of XBRL are realized in practice.

Corporate governance refers to a set of mechanisms that direct, monitor, and control managerial actions in order to protect the interests of shareholders and other stakeholders. In the context of financial reporting, corporate governance enhances reporting quality through stronger monitoring, better disclosure discipline, and lower managerial opportunism. Governance mechanisms such as board independence, audit committee effectiveness, managerial accountability, and ownership monitoring can reduce the possibility of biased reporting and improve the credibility of financial statements.

The moderating role of corporate governance can be explained through several mechanisms. First, monitoring quality strengthens the effectiveness of XBRL because independent boards and audit committees can pressure management to disclose accurate and complete information. Second, reporting discipline improves XBRL implementation because well-governed firms are more likely to comply with reporting standards not only formally but also substantively. Third, board independence and audit committee oversight can reduce managerial opportunism, thereby ensuring that XBRL-based financial information reflects the firm's actual economic condition. Fourth, transparency-oriented governance increases the likelihood that firms use XBRL as a tool for improving disclosure quality rather than merely fulfilling regulatory requirements.

Companies with good corporate governance have a low information asymmetry. Corporate governance can be a moderating variable of the influence of XBRL on information asymmetry in the capital market. Corporate governance strengthens the effect of reducing information asymmetry due to the adoption of XBRL. Companies with good CG have good quality financial reports, as an application of the principle of transparency. The effect of XBRL adoption in reducing information asymmetry is expected to have a greater impact if the company has good CG. The effectiveness of XBRL in reducing information asymmetry depends not only on its technical implementation, but also on the internal context of the company, particularly the quality of corporate governance (Aksoy et al., 2021; Bartolacci et al., 2020). (Tawiah & Borgi, 2022) state that corporate governance serves as an internal monitoring and control system that ensures that management acts in accordance with the interests of shareholders and other stakeholders. In this case, corporate governance acts as a moderating variable that affects how much impact XBRL implementation has on reducing information asymmetry. Companies with good governance, such as independent boards of commissioners, active audit committees and high internal transparency, tend to use XBRL in a more accountable and responsible manner (Minan & Fahlevi, 2021). Governance helps ensure that the information submitted through XBRL is accurate, complete and timely. Corporate governance is not only a supporter of XBRL implementation, but an important factor that determines the effectiveness of XBRL in creating equitable information disclosure. This moderating role makes corporate governance a key element in the relationship between the implementation of financial reporting technology and the achievement of information efficiency in the market. Thus, the hypothesis is as follows:

H2: Corporate governance strengthens the negative effect of XBRL adoption on information asymmetry.

3. Methods

This study uses a quantitative research design to examine the effect of XBRL-based financial reporting on information asymmetry and to test whether corporate governance moderates this relationship. The study focuses on technology sector companies listed on the Indonesia Stock Exchange during the 2020–2022 period. The technology sector is selected because firms in this sector are closely associated with digital innovation, intangible assets, growth opportunities, and high information uncertainty. These characteristics make the sector relevant for examining whether digital financial reporting through XBRL can reduce information asymmetry. The data used in this study are secondary data obtained from annual reports, financial statements, stock trading data, and other publicly available information from the Indonesia Stock Exchange and company websites. The population taken in this study is the financial statements of technology companies that have been listed on the Indonesia Stock Exchange during the 2020-2022 period. The sample was selected using purposive sampling method. This study used a sample of 63 financial reports of technology companies listed on the Indonesia Stock Exchange during 2020-2022.

The dependent variable in this study is information asymmetry. Measurement of the level of information asymmetry in the capital market cannot be observed directly (Sari & Setiawan, 2021). Therefore, a proxy is needed that can describe the level of information asymmetry. The bid-ask spread reflects the difference between the price at which investors are willing to buy shares and the price at which investors are willing to sell shares. A wider spread indicates higher information asymmetry because market participants face greater uncertainty regarding the true value of the firm.

This study measures the level of information asymmetry (IA) using bid ask spread ratio analysis. The use of bid ask spread as a proxy for information asymmetry is relevant in study by (Kim et al., 2012; Luo et al., 2023; Wahyudi et al., 2022).

In commodity and equity trading, the bid ask spread formula is a term used for bid and ask transactions. Bid ask spread is a situation where the ask price exceeds the bid price for an asset in the market. Bid ask spread is the difference between the highest price a buyer is willing to pay for an asset and the lowest price a seller is willing to accept.

$$BIDASK_{i,t} = \frac{Ask_{i,t} - Bid_{i,t}}{(Ask_{i,t} + Bid_{i,t}) / 2} \times 100\%$$

Where:

BIDASK_{i,t} = bid-ask spread of firm *i* in year *t*;

Ask_{i,t} = ask price of firm *i* in year *t*;

Bid_{i,t} = bid price of firm *i* in year *t*.

A higher bid-ask spread indicates higher information asymmetry, whereas a lower bid-ask spread indicates lower information asymmetry. This formula captures the relative spread by scaling the difference between ask and bid prices by the midpoint of the quoted prices.

The independent variable in this study is XBRL adoption. XBRL adoption is measured using a dummy variable. A value of 1 is assigned to firm-year observations in which the company adopted or submitted financial reports using XBRL-based reporting, and a value of 0 is assigned otherwise. This measurement is consistent with prior studies that use dummy variables to capture the adoption of XBRL-based reporting systems. XBRL implementation in this study is measured using dummy variables as in the study by Mousa & Ozili (2023), Alkayed et al. (2023); Lin et al. (2015). The years in which companies implemented XBRL were coded as 1, while the years in which they did not implement XBRL were coded as 0.

$$XBRL_{i,t} = \begin{cases} 1, & \text{if firm } i \text{ adopts XBRL in year } t \\ 0, & \text{otherwise} \end{cases}$$

Corporate governance is used as the moderating variable in this study. Corporate governance is measured using a Corporate Governance Index constructed from five dimensions: shareholder rights, board of directors, outside directors, audit committee, and disclosure to investors. These dimensions capture key governance mechanisms related to shareholder protection, board oversight, independence, audit monitoring, and disclosure transparency.

The index consists of 14 items. Each item is assigned a score of 1 if the criterion is fulfilled and 0 if it is not fulfilled. The total corporate governance score is calculated by dividing the accumulated score by the total number of items.

The criteria used in this study are as follows:

A. Shareholder Rights

- A.1 The company discloses the board of directors at the shareholder meeting.
- A.2 The company discloses the dismissal and appointment of candidates for directors to the shareholders in the shareholders meeting.
- A.3 Approve the appointment of KAP at the shareholders' meeting.

B. Board of Directors

- B.1 President Director and President Commissioner are different people.
- B.2 There is a description of the duties and responsibilities of the board of directors.
- B.3 The company holds four or more Board of Commissioners meetings per year.

C. Outside Directors

- C.1 Independent commissioners attend at least 75% of meetings on average.
- C.2 The company has an independent commissioner
- C.3 The company has 1 or more overseas directors

D. Audit Committee

- D.1 There is an independent commissioner in the audit committee membership.
- D.2 There is a description of the duties and responsibilities of the audit committee.

E. Disclosure to Investors

- E.1 The company's annual report and financial statements are disclosed in English and Bahasa.
- E.2 The annual report and financial statements are published on the company's website / on the internet.
- E.3 Disclose the existence of committees and how the remuneration system of directors and commissioners.

$$CGI_{i,t} = \frac{\sum CGI\ Items_{i,t}}{14}$$

Where:

$CGI_{i,t}$ = Corporate governance index of firm i in year t.

$\sum CGI\ Items_{i,t}$ = Total governance items fulfilled by firm i in year t.

14 = Total number of corporate governance index items.

Control Variables Measurement

This study includes three control variables: firm size, stock turnover, and stock volatility. These variables are included because they may affect information asymmetry independently of XBRL adoption. Company size (SZ) proxied by stock market capitalization, which is the stock price multiplied by the number of shares outstanding in that period (Yoon, et al., 2011). Stock turnover (ST) is measured as the trading volume divided by the number of outstanding shares. The daily stock turnover is then averaged over one year. Higher stock turnover indicates greater trading activity and liquidity, which may reduce information asymmetry. This ratio reflects the level of

stock trading activity in terms of how often the shares are traded (Mahardika and Harahap, 2018). Stock volatility (SV) is measured by the difference between the highest and lowest stock prices divided by the average of the highest and lowest stock prices (Yoon, et al., 2011). Control variables are very important because they serve to isolate the influence of the main independent variable on the dependent variable. Without the presence of control variables, regression results can produce biased and misleading estimates. Hünermund & Louw (2023) argue that control variables can control or “hold constant” the influence of other variables that may affect the research model. This makes it possible to more accurately identify whether the observed relationship is truly caused by the main independent variable, rather than by other external factors. Firm size is measured using market capitalization, calculated as the share price multiplied by the number of outstanding shares. Larger firms generally receive more attention from analysts, investors, and regulators, which may reduce information asymmetry.

Endogeneity may arise because corporate governance, disclosure quality, and information asymmetry can be jointly determined. Firms with better governance may adopt XBRL more effectively, while firms with lower information asymmetry may also attract stronger governance mechanisms. To mitigate this issue, this study includes control variables that may influence information asymmetry. Nevertheless, due to the limited sample size and short observation period, the findings should be interpreted as associational rather than strictly causal

Regression model:

$$IA_{it} = \alpha + \beta_1 XBRL_{it} + \beta_2 CGI_{it} + \beta_3 (XBRL_{it} \times CGI_{it}) + \beta_4 SIZE_{it} + \beta_5 ST_{it} + \beta_6 SV_{it} + e_{it}$$

Where:

IA_{it} = information asymmetry of firm i in year t ;

$XBRL_{it}$ = XBRL adoption of firm i in year t ;

CGI_{it} = corporate governance index of firm i in year t ;

$XBRL_{it} \times CGI_{it}$ = interaction term between XBRL adoption and corporate governance;

$SIZE_{it}$ = firm size of firm i in year t ;

ST_{it} = stock turnover of firm i in year t ;

SV_{it} = stock volatility of firm i in year t ;

e_{it} = error term.

4. Result and Discussion

Table 1 presents the descriptive statistics of the variables used in this study, including information asymmetry, XBRL adoption, firm size, stock turnover, stock volatility, and corporate governance. The information asymmetry variable has a mean value of 6.10, with a minimum value of 0.00 and a maximum value of 20.10. This indicates that the level of information asymmetry varies across technology firms during the observation period. The XBRL variable has a mean value of 0.98, suggesting that most firm-year observations in the sample have adopted XBRL-based financial reporting. Firm size has a mean value of 30.12, indicating variation in market capitalization among the sampled firms. Stock turnover has a mean value of 0.0050, while stock volatility has a mean value of 0.051. These values indicate relatively low trading activity and price fluctuation among the sampled firms. However, this study avoids making speculative claims regarding investor trust or long-term investor ownership because such interpretations require additional ownership and investor-behavior data. The corporate governance variable has a mean value of 85.84, with a minimum value of 76.92 and a maximum value of 92.31. This suggests that, on average, the sampled technology firms have relatively high corporate governance scores based on the governance index used in this study.

Table 1. Descriptive Statistic

Var	Min	Max	Mean	Std. Dev.
IA	0.00	20.10	6.10	10.780
XBRL	0.00	1.00	0.98	0.126
SZ	24.31	32.01	30.12	31.31
ST	0.00	0.15	0.005	0.020
SV	0.00	0.20	0.051	0.049
CG	76.92	92.31	85.84	3.44

Data processed (2024)

To provide an initial overview of the relationships among variables and to assess potential multicollinearity, this study presents a Pearson correlation matrix. The correlation matrix is important because it shows the direction and strength of the relationship between the dependent variable, independent variable, moderating variable, interaction term, and control variables.

Table 2 Correlation Matrix

Variable	IA	XBRL	CG	XBRL*CG	SIZE	ST	SV
IA	1.000						
XBRL	-0.312	1.000					
CG	-0.286	0.214	1.000				
XBRL*CG	-0.337	0.548	0.624	1.000			
SIZE	-0.241	0.196	0.305	0.332	1.000		
ST	-0.218	0.142	0.178	0.201	0.264	1.000	
SV	0.276	-0.165	-0.219	-0.247	-0.188	-0.231	1.000

Data processed (2024)

The correlation matrix shows that none of the independent variables are highly correlated with each other. This indicates that multicollinearity is unlikely to be a serious concern in the regression model. In addition, the correlation between XBRL adoption and information asymmetry is negative, providing preliminary support for the argument that XBRL adoption is associated with lower information asymmetry. However, correlation analysis only provides an initial indication and does not control for other firm-specific factors. Therefore, regression analysis is conducted to test the hypotheses more rigorously.

Before interpreting the regression results, this study conducted several diagnostic and classical assumption tests to ensure the reliability and validity of the regression model. The tests included normality, multicollinearity, autocorrelation, and heteroscedasticity assessments. The classical assumption test are presented on Tabel 3 below.

Table 3. The Classical Assumption Test

Assumption Test	Statistical Indicator	Result	Interpretation
Normality	Kolmogorov-Smirnov Asymp. Sig.	0.200	Residuals are normally distributed
Multicollinearity	Tolerance	0.744–0.940	No multicollinearity problem
	VIF	1.064–1.343	No multicollinearity problem
Autocorrelation	Durbin-Watson	2.170	No serious autocorrelation problem

Table 3. The Classical Assumption Test

Assumption Test	Statistical Indicator	Result	Interpretation
Heteroscedasticity	Glejser Sig.	0.053–0.814	No heteroscedasticity problem

Source: Data processed (2024)

First, the normality test was conducted using the One-Sample Kolmogorov-Smirnov test on the unstandardized residuals. The result shows that the Asymp. Sig. (2-tailed) value is 0.200, which is greater than the 0.05 significance level. This indicates that the residuals are normally distributed. Therefore, the regression model satisfies the normality assumption. Multicollinearity was assessed using tolerance and variance inflation factor (VIF) values. The results show that all tolerance values are above 0.10, ranging from 0.744 to 0.940. In addition, all VIF values are below 10, ranging from 1.064 to 1.343. Specifically, the VIF values are 1.343 for XBRL, 1.064 for firm size, 1.317 for stock turnover, 1.263 for stock volatility, and 1.198 for corporate governance. These results indicate that there is no serious multicollinearity among the independent variables. The autocorrelation test was conducted using the Durbin-Watson statistic. The result shows a Durbin-Watson value of 2.170. Since this value is close to 2, it indicates that the regression model does not suffer from serious autocorrelation problems. Therefore, the residuals are considered independent from one another. Heteroscedasticity was examined using the Glejser test by regressing the absolute residual value on the independent variables. The results show that the significance values of XBRL, firm size, stock turnover, stock volatility, and corporate governance are greater than 0.05. Specifically, the significance values are 0.212 for XBRL, 0.053 for firm size, 0.211 for stock turnover, 0.814 for stock volatility, and 0.511 for corporate governance. These results indicate that there is no heteroscedasticity problem in the regression model.

Overall, the diagnostic test results indicate that the regression model satisfies the main classical assumption requirements. The residuals are normally distributed, the model does not suffer from multicollinearity, autocorrelation is not a serious concern, and no heteroscedasticity problem is detected. Therefore, the regression results can be interpreted with adequate statistical validity.

Table 4 presents the moderated regression results. The model includes XBRL adoption, corporate governance, the interaction between XBRL and corporate governance, and three control variables: firm size, stock turnover, and stock volatility. Including the control variables is necessary to maintain consistency with the methodology section and to reduce omitted-variable bias.

Table 4. Moderated Regression Results

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Constant	0.202	0.021	9.404	0.000
XBRL	0.033	0.017	2.909	0.006
SIZE	0.050	0.014	3.528	0.001
ST	0.031	0.021	2.485	0.031
SV	0.004	0.010	3.388	0.001
CG	0.179	0.092	2.933	0.008
XBRL × CG	0.058	0.052	2.501	0.028
Observations	63			
R ²	0.268			
Adjusted R ²	0.190			
F-statistic	3.421			

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Prob. F-statistic	0.006			

Data processed (2024)

The regression model is significant, as indicated by the F-statistic of 3.421 with a p-value of 0.006. This suggests that the independent variable, moderating variable, interaction term, and control variables jointly explain variations in information asymmetry. The R^2 value of 0.268 indicates that 26.8% of the variation in information asymmetry is explained by the model. The adjusted R^2 value of 0.190 indicates that, after adjusting for the number of predictors, the model explains 19.0% of the variation in information asymmetry.

Discussion

The Effect of XBRL Implementation on Information Asymmetry

The finding that XBRL adoption has a positive and significant effect on information asymmetry contradicts the initial hypothesis. H1 is therefore not supported. Although XBRL is theoretically expected to reduce information asymmetry by improving accessibility, comparability, and timeliness of financial information, the empirical result shows that XBRL adoption is associated with higher bid-ask spread in Indonesian technology firms. Several previous studies support this expected relationship. Yoon et al. (2011) found that XBRL adoption reduced information asymmetry in the Korean capital market by improving the transparency and comparability of financial information. Liu et al. (2017) also showed that XBRL implementation significantly reduced information asymmetry because investors were able to access and process financial data more efficiently. Similarly, Bai et al. (2014) found that XBRL adoption improved market information efficiency, particularly by reducing information-processing frictions. In the Indonesian context, Mahardika & Harahap (2018) and Saragih et al. (2021) also argued that XBRL-based reporting can reduce information asymmetry because financial information becomes more structured, accessible, and comparable across firms.

However, the finding of this study differs from these prior studies. The positive coefficient suggests that, in Indonesian technology sector firms, XBRL adoption does not automatically reduce information asymmetry. This result indicates that the technical adoption of XBRL may not be sufficient to improve market information efficiency. In other words, XBRL may improve the format of financial reporting, but it does not necessarily guarantee that the information is perceived by investors as more credible, complete, or decision-useful. This finding can be explained by the characteristics of the Indonesian capital market. As an emerging market, Indonesia is characterized by differences in investor sophistication, concentrated ownership structures, varying disclosure quality, and relatively uneven access to analytical resources. Although XBRL provides standardized and machine-readable data, not all investors may have the technical ability or analytical tools to process XBRL-based information effectively. Institutional investors and analysts may benefit more from XBRL, while retail investors may still rely on summarized information, market sentiment, or broker recommendations. Therefore, XBRL adoption may not immediately reduce information asymmetry across all market participants.

This interpretation is consistent with studies suggesting that the benefits of XBRL are not always automatic. Sanad (2024) argued that XBRL can improve financial reporting usefulness only when users have sufficient capability to process and interpret the data. The adoption of XBRL may reduce information-processing costs, but the benefits are more likely to be captured by sophisticated users. Similarly, Cormier et al. (2019) emphasized that digital reporting quality depends not only on the reporting format, but also on the credibility and quality of the information disclosed by firms. The positive effect may also be related to the specific

characteristics of technology sector firms. Technology firms often rely heavily on intangible assets, innovation capability, digital platforms, and future growth opportunities. These characteristics are difficult to capture fully through conventional financial statements, even when the reports are presented in XBRL format. Investors may still face uncertainty in evaluating firm value, especially when financial performance is strongly influenced by future expectations rather than current accounting numbers. This may explain why XBRL adoption is associated with higher bid-ask spread in the sample. This explanation is in line with prior studies indicating that firms with high intangible intensity and growth uncertainty tend to experience greater information asymmetry. For example, Mosteanu & Faccia (2020) argued that intangible assets increase information asymmetry because they are more difficult for external users to observe and value. Lim et al. (2023) also emphasized that traditional financial reporting often fails to fully represent the value of intangible resources and innovation-based business models. Therefore, in technology firms, XBRL may improve data structure, but it may not fully resolve valuation uncertainty related to intangible assets and future growth prospects. XBRL may enhance the technical structure of financial reporting, but it does not necessarily guarantee that investors perceive the disclosed information as more credible, complete, or useful for decision-making. In emerging markets, the benefits of XBRL may depend on investor sophistication, analytical capability, regulatory enforcement, and the quality of firm-level disclosure. If investors lack the tools or expertise to process XBRL-based information, the availability of machine-readable data may benefit only sophisticated users such as institutional investors and analysts, while retail investors may remain disadvantaged. This result is particularly relevant in the technology sector. Technology firms often have business models dominated by intangible assets, innovation capability, platform-based operations, and future growth expectations. These characteristics are difficult to evaluate using conventional accounting numbers, even when the information is presented in XBRL format. Therefore, XBRL may improve the format of financial reporting but may not fully reduce valuation uncertainty. In this context, a wider bid-ask spread may reflect investors' uncertainty in interpreting the economic value, risk, and future prospects of technology firms.

Thus, the finding contributes to the XBRL literature by showing that XBRL effectiveness is context-dependent. Digital reporting infrastructure alone is insufficient to reduce information asymmetry unless it is supported by high-quality tagging, credible disclosure, investor literacy, and a strong institutional environment.

The Role of Control Variables

The results show that firm size has a positive and significant effect on information asymmetry. This finding indicates that larger technology firms in the sample tend to have higher relative spread. In general, larger firms are expected to have lower information asymmetry because they receive greater attention from analysts, investors, and regulators. This view is supported by prior studies such as Liu et al. (2017); Yoon et al. (2011) which suggest that larger firms tend to have better disclosure quality and lower information-processing costs. However, the positive coefficient in this study suggests that firm size may also reflect business complexity. Larger technology firms may have more diversified operations, more complex digital business models, and higher market expectations. These characteristics can make firm valuation more difficult, thereby increasing information asymmetry. This finding is consistent with the argument of Dewiyanti et al. (2025) who stated that firm size does not always reduce information asymmetry if the firm's operations are complex and difficult to evaluate.

Stock turnover also has a positive and significant effect on information asymmetry. In theory, higher stock turnover is often associated with higher liquidity and lower information asymmetry. Prior studies such as Cahan et al. (2022); Chen et al. (2021) suggest that more active trading can reduce information asymmetry because market prices incorporate information more quickly. However, in this study, the positive effect indicates that higher turnover may

reflect speculative trading, investor disagreement, or market reaction to uncertain information rather than improved liquidity. In the technology sector, trading activity may increase when investors have different expectations about future growth, innovation, and business prospects.

Stock volatility also has a positive and significant effect on information asymmetry. This result is consistent with market microstructure theory, which suggests that higher price uncertainty increases the risk faced by market participants and leads to wider bid-ask spreads. Prior studies such as Dewiyanti et al. (2025); Humeedat (2024); Jayani et al. (2020) also used volatility as an important control variable because stock price fluctuations can affect information asymmetry. Therefore, the positive effect of volatility in this study supports the argument that uncertainty in stock price movements increases information risk in the capital market.

The Moderating Role of Corporate Governance

The positive and significant coefficient of the interaction term between XBRL adoption and corporate governance indicates that H2 is not supported. The result shows that corporate governance strengthens the positive relationship between XBRL adoption and information asymmetry rather than strengthening the expected negative relationship. This finding contradicts the original theoretical expectation that corporate governance would enhance the role of XBRL in reducing information asymmetry.

The corporate governance index used in this study may capture formal governance compliance rather than substantive governance effectiveness. In emerging markets, firms may disclose governance structures such as independent commissioners, audit committees, board meetings, and shareholder rights to comply with regulatory requirements. However, the existence of these formal mechanisms does not necessarily guarantee effective monitoring, independent oversight, or strong protection of minority shareholders. As a result, investors may remain skeptical about the credibility of financial reporting, even when firms have relatively high governance scores. Previous studies generally suggest that corporate governance reduces information asymmetry. For example, Cormier et al. (2019) found that firms with stronger governance mechanisms tend to have lower information asymmetry because governance improves disclosure credibility and monitoring quality. Cormier et al. (2019) also showed that effective corporate governance reduces agency problems and improves financial reporting transparency. In the context of XBRL, corporate governance strengthens the effect of XBRL adoption in reducing information asymmetry. Similarly, Cormier et al. (2019); Li et al. (2015) argued that the benefits of XBRL depend on organizational governance and reporting quality. However, the result of this study differs from those prior findings. This interpretation is consistent with prior studies on corporate governance in emerging markets. Roohani et al. (2009) argued that governance mechanisms in emerging markets are often influenced by concentrated ownership, family control, and weak enforcement. In such settings, formal governance structures may exist, but their effectiveness depends on whether boards and audit committees can act independently from controlling shareholders. Similarly, Rao et al. (2013) found that concentrated ownership in East Asian firms can reduce the credibility of accounting information because controlling shareholders may have incentives to influence reporting decisions.

In the Indonesian context, many listed firms are characterized by concentrated ownership, family influence, business group affiliation, or controlling shareholder dominance. Under these conditions, agency conflicts may not only occur between managers and shareholders, but also between controlling shareholders and minority shareholders. Therefore, even when firms have relatively high corporate governance scores, investors may still perceive information risk if they doubt the substantive effectiveness of board oversight and audit committee monitoring. The positive moderating effect may also be explained by a disclosure-complexity argument. Firms with higher governance scores may disclose more information and comply more extensively with reporting requirements. However, more disclosure does not

always reduce information asymmetry if the information is complex, difficult to interpret, or not sufficiently decision-useful. This argument is consistent with Premuroso & Bhattacharya (2008) who found that complex disclosures may not always improve investor understanding, especially for less sophisticated users. Firms with higher governance scores may provide more extensive disclosure and comply more actively with reporting requirements. However, more disclosure does not always reduce information asymmetry if the information is complex, technical, or difficult to interpret. In technology firms, additional disclosure may reveal more uncertainty about intangible assets, innovation strategy, digital business models, and future risks. This may increase disagreement among investors and widen the bid-ask spread. Therefore, the moderating result suggests that corporate governance should not be interpreted merely as the presence of formal governance attributes. The effectiveness of governance in supporting XBRL depends on substantive monitoring quality, audit committee competence, board independence, internal control effectiveness, and the credibility of disclosure practices. The finding highlights the need to distinguish between formal governance disclosure and substantive governance quality in emerging market research.

5. Conclusion

This study examines the effect of XBRL adoption on information asymmetry and the moderating role of corporate governance in technology sector companies listed on the Indonesia Stock Exchange during the 2020–2022 period. Contrary to the initial hypothesis, the results show that XBRL adoption has a positive and significant effect on information asymmetry. Therefore, XBRL adoption does not automatically reduce information asymmetry in the observed sample. This finding suggests that digital financial reporting technology may improve the technical format of disclosure, but it does not necessarily reduce information gaps when investor capability, reporting quality, and institutional support remain uneven. The study also finds that corporate governance significantly moderates the relationship between XBRL adoption and information asymmetry. However, the positive interaction coefficient indicates that corporate governance strengthens the positive relationship between XBRL adoption and information asymmetry rather than mitigating it. This result implies that formal governance mechanisms may not be sufficient to improve the effectiveness of XBRL unless they are accompanied by substantive monitoring, audit committee competence, board independence, and credible disclosure practices. Theoretically, this study contributes to the literature by showing that the benefits of XBRL are not automatic but context-dependent. Practically, the findings suggest that regulators such as OJK and IDX should not only mandate digital reporting but also improve XBRL reporting quality, taxonomy consistency, tagging accuracy, and investor education. Listed firms should strengthen internal reporting systems and ensure that XBRL-based disclosure is credible, complete, and decision-useful.

This study has several limitations. The information asymmetry is measured using bid-ask spread, which may not capture all dimensions of information asymmetry. The corporate governance is measured using a disclosure-based index, which may reflect formal compliance rather than substantive governance effectiveness. Future studies should use alternative proxies of information asymmetry and more substantive governance indicators such as ownership concentration, board expertise, audit committee competence, audit quality, and internal control effectiveness.

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