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The Effects of Momentum Trading, Market Volatility, and Liquidity on the Risk of Sharia Stock Portfolios in Indonesia

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Abstract: This study aims to analyze the effect of momentum trading, market volatility, and liquidity on the risk of sharia stock portfolios at Islamic banks in Indonesia. The research population consists of four Islamic banks listed on the Indonesia Stock Exchange (BANK, BRIS, BTPS, and PNBS) during the period 2022–2024. Data were obtained from the official website of the Indonesia Stock Exchange and processed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with the help of the SmartPLS 4 application. The independent variables used were momentum trading (RSI, MACD, Stochastic Oscillator), market volatility (ATR and Bollinger Bandwidth), and liquidity (Turnover Ratio and Bid-Ask Spread), while the dependent variables were sharia stock portfolio risk (Beta and Standard Deviation). The results of the study indicate that momentum trading and market volatility have a positive and significant effect on the risk of sharia stock portfolios, while liquidity has no significant effect. Simultaneously, all three variables have a significant effect on portfolio risk with an R^2 value of 0.829. These findings indicate that market volatility is the dominant factor affecting the risk of sharia stock portfolios in Indonesia. The implication of this study is that investors need to pay attention to technical indicators such as momentum and volatility to minimize investment risk, while Islamic capital market managers are advised to improve literacy and transparency so that investment strategies are more oriented towards fundamentals and Islamic principles.

Keywords: Momentum Trading, Market Volatility, Liquidity, Portfolio Risk, Sharia Stocks.

Introduction

Background of The Study

The capital market plays a strategic role in driving economic growth because it serves as a means for companies to obtain funds and for investors to invest their capital productively (Eduardus Tandelilin, 2020). Sharia stocks are becoming increasingly popular in Indonesia as public awareness of Islamic financial principles grows. These instruments are traded through indices such as the Jakarta Islamic Index (JII) and the Indonesian Sharia Stock Index (ISSI), which ensure that all transactions comply with

Islamic principles and are free from usury, excessive speculation (gharar), and gambling (maisir) (Harun, 2007). Otoritas Jasa Keuangan (2024) shows that ISSI now covers more than 600 issuers, reflecting the significant growth of the Islamic capital market in Indonesia.

Global capital markets over the past few decades have shown that dynamics such as rapid price movements, short-term investor behavior, and liquidity levels play an important role in risk formation. Momentum trading strategies, which involve buying stocks that have performed well in the previous period and selling stocks that have performed poorly, have been highlighted in financial literature for their potential to generate abnormal returns. However, these strategies also increase risk exposure when market conditions change, especially in emerging markets such as Indonesia, which are characterized by high volatility and limited liquidity.

The Indonesian capital market, which is increasingly integrated with global markets, has experienced sharp fluctuations, as reflected in the movement of the Composite Stock Price Index (IHSG) during periods of global uncertainty such as the COVID-19 pandemic and geopolitical crises (Antonio et al, 2013). As interest in halal investment grows, the sharia stock market is expanding rapidly. However, sharia stocks remain vulnerable to volatility and liquidity changes that can increase portfolio risk. Sharia investors face additional challenges because their portfolios must meet Islamic criteria through a screening process conducted by the National Sharia Council Fatwa of Indonesian Council of Ulama (DSN-MUI) and the Financial Services Authority (OJK), thereby limiting diversification opportunities and potentially increasing the risks associated with momentum strategies (Putri & Sartika, 2023).

Previous studies have shown that market volatility and stock liquidity have a significant impact on stock returns. Situmeang & Muharam (2015) showed that price volatility, stock liquidity, and overnight momentum affect stock returns in LQ45 companies from 2009 to 2013. Nanda (2019) analyzed abnormal return momentum and contrarian behavior in sharia stocks on the Jakarta Islamic Index, but the focus was limited to returns without an in-depth examination of portfolio risk. Antonio et al. (2013) compares the volatility of the Indonesian and Malaysian Islamic capital markets with macroeconomic indicators, but has not simultaneously integrated momentum trading and liquidity factors. Putri & Sartika (2023) analyzed the return and risk of the optimal sharia stock portfolio using a single index model, but did not specifically test the effect of momentum trading, volatility, and liquidity as independent variables.

The majority of previous studies analyzed variables separately and did not model the simultaneous relationship between momentum trading, market volatility, and liquidity in terms of sharia stock portfolio risk. Other limitations include a lack of consideration of the dynamics of sharia stock inflows and outflows in the index (sharia-compliance risk) and the limited diversification effect on Islamic portfolios. Therefore, there is a research gap that needs to be bridged through a quantitative approach that tests the simultaneous influence of these three variables on sharia stock portfolio risk. This study aims to fill this gap by analyzing the effects of momentum

trading, market volatility, and liquidity on the risk of sharia stock portfolios in Islamic banks in Indonesia. The purpose of this study is to examine the influence of momentum trading, market volatility, and liquidity, both partially and simultaneously, on the risk of sharia stock portfolios in Islamic banks in Indonesia.

Momentum trading is an investment strategy based on the tendency of stock prices to continue their current trend, whether upward or downward. This strategy involves buying stocks that have shown superior performance over a certain period (winners) and selling or avoiding stocks with poor performance (losers) in the hope that this performance pattern will continue in the future.

In terms of the Islamic capital market, Nanda (2019) studied the momentum and contrarian phenomena in Jakarta Islamic Index stocks and found that momentum strategies can still provide abnormal returns, but with higher risks due to the limited universe of sharia stocks. Momentum trading can be measured using several methods, including the Relative Strength Index (RSI), Moving Average Convergence Divergence (MACD), and Stochastic.

Momentum trading strategies affect portfolio risk through several mechanisms: first, momentum strategies tend to concentrate investments in certain sectors or industries that are performing well, thereby reducing diversification and increasing specific risk. Second, momentum trading can create overreaction and herd behavior that amplify price volatility. Third, when a market reversal occurs, momentum portfolios suffer greater losses due to their concentrated positions in stocks that had previously been performing well.

Market volatility describes the degree of fluctuation or instability in stock prices in a market over a given period of time (Hisam, 2024). Volatility is one of the main indicators of risk in investing because it reflects the uncertainty of future price movements. The higher the volatility, the greater the deviation of actual returns from expected returns, which means the higher the investment risk.

Market volatility can be measured using several indicators, including Average True Range (ATR) and Bollinger Bandwidth. Market volatility affects portfolio risk in two ways: first, high volatility directly increases portfolio return variance. Second, high volatility can trigger changes in the correlation between stocks (contagion effect), thereby reducing the benefits of diversification and increasing portfolio risk.

Stock liquidity refers to the ability of stocks to be traded quickly in large volumes without causing significant price changes (Faozan, 2020). Liquidity is an important characteristic in capital markets because it affects transaction costs, order execution speed, and the risks faced by investors. Liquid stocks have small bid-ask spreads, high trading volumes, and sufficient market depth to accommodate large transactions.

In terms of the sharia stock market, Cahyani & Wirawati (2019) explain that the liquidity of sharia stocks is generally lower than conventional stocks due to a more limited stock universe and restrictions on investors who can only invest in stocks that meet sharia criteria. This limited liquidity creates liquidity risk, which is the risk that

investors will have difficulty selling shares when needed or will have to sell at a price lower than the fair value.

Liquidity can be measured using several indicators (Rahmatya, 2025): the turnover ratio, which compares trading volume with the number of shares outstanding, and the bid-ask spread, which measures the difference between the highest bid price and the lowest ask price.

Faozan (2020) on companies listed on the Indonesian Sharia Stock Index (ISSI) shows that corporate financial performance affects the liquidity of sharia stocks. Companies with good financial performance tend to have higher liquidity because they attract greater investor interest. Conversely, stocks with low liquidity face higher risks due to difficulties in adjusting portfolios when necessary.

Liquidity has a negative effect on portfolio risk, whereby the higher the liquidity of stocks in the portfolio, the lower the liquidity risk faced by investors. However, in stressful market conditions, liquidity can dry up suddenly (liquidity dry-up), thereby increasing portfolio risk.

The risk of a sharia stock portfolio is the potential loss or deviation of actual returns from expected returns in a portfolio investment consisting of stocks that meet sharia criteria. Sharia stocks are stock-type securities that do not conflict with sharia principles in the capital market, issued by issuers whose business activities do not conflict with sharia principles such as gambling, usury, buying and selling risks that contain uncertainty (gharar), and other activities prohibited in Islam.

Putri & Sartika (2023) explain that the risk of sharia stock portfolios has specific characteristics compared to conventional portfolios due to diversification limitations resulting from the sharia screening process conducted by the National Sharia Council Fatwa of Indonesian Council of Ulama (DSN-MUI) and the Financial Services Authority (OJK). This screening results in a more limited number of stocks that can be included in sharia portfolios, making company-specific risks more dominant. In addition, there is sharia-compliance risk, which is the risk when a stock is removed from the Sharia Securities List (DES), which is updated every six months, forcing sharia investors to make sudden portfolio adjustments.

Portfolio risk can be measured using several approaches, including the standard deviation of portfolio returns, which measures total risk, and portfolio beta, which measures systematic risk. The unique characteristics of the sharia market mean that portfolio risk management requires a different approach from conventional portfolios, particularly in terms of diversification strategies, which must remain consistent with sharia principles. Based on the above problem formulation, the objectives of this study are as follows: analyzing the effect of momentum trading on the risk of sharia stock portfolios at Islamic banks in Indonesia, analyzing the effect of market volatility on the risk of sharia stock portfolios at Islamic banks in Indonesia, analyzing the effect of liquidity on the risk of sharia stock portfolios at Islamic banks in Indonesia, and analyzing the simultaneous effects of momentum trading, market volatility, and liquidity on the risk of sharia stock portfolios at Islamic banks in Indonesia.

Research Method

Conceptual Framework

Based on the literature review described above, the conceptual framework of this study describes the relationship between independent variables (momentum trading, market volatility, and liquidity) and dependent variables (sharia stock portfolio risk). The conceptual framework is presented as follows:

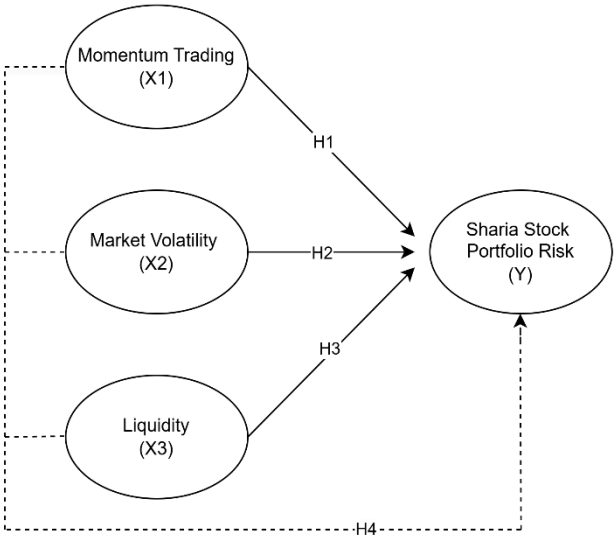

Figure 1. Conceptual Framework
Source: Data processed by the researcher

Based on the conceptual framework and literature review, the research hypothesis is formulated as follows:

H1: Momentum trading has a significant effect on the risk of sharia stock portfolios at Islamic banks in Indonesia.

H2: Market volatility has a significant effect on the risk of sharia stock portfolios at Islamic banks in Indonesia.

H3: Liquidity has a significant effect on the risk of sharia stock portfolios at Islamic banks in Indonesia.

H4: Momentum trading, market volatility, and liquidity simultaneously have a significant effect on the risk of sharia stock portfolios at Islamic banks in Indonesia.

Research Design

This study uses a quantitative design with a causal approach to examine the effect of momentum trading, market volatility, and liquidity on the risk of sharia stock portfolios at Islamic banks in Indonesia. This study uses secondary data in the form of historical daily stock prices and trading volumes obtained from the Indonesia Stock Exchange through the Yahoo Finance and idx.co.id platforms for the period 2022-2024. The analysis method used is Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software.

Population and Sample

The population in this study consists of all Islamic banks listed on the Indonesia Stock Exchange and registered in the Sharia Securities List (DES). The sampling technique used purposive sampling with the following criteria:

Criteria**:**

1. Islamic banks whose shares are listed on the Indonesia Stock Exchange.
2. Included in the Sharia Securities List (DES) published by the OJK consistently during the research period (2022-2024).
3. Have complete stock price and trading volume data during the research period.

Based on these criteria, the research sample consisted of four (4) Islamic banks that met the criteria, namely:

1. PT Bank Aladin Syariah Tbk (stock code: BANK)
2. PT Bank Syariah Indonesia Tbk (stock code: BRIS)
3. PT Bank BTPN Syariah Tbk (stock code: BTPS)
4. PT Bank Panin Dubai Syariah Tbk (stock code: PNBS)

The research data uses annual aggregation for a period of 3 years (2022, 2023, and 2024), resulting in 3 annual observations for each stock. The total observations in this study are 12 observations (3 years × 4 stocks).

The Definition of Operational and Measurement Variables

Independent Variable

1. Momentum Trading (X1)

Momentum trading is measured using three reflective indicators that measure the tendency of prices to continue their trend movement:

Indicator X1.1: Relative Strength Index (RSI)

RSI measures the speed and change in price movements to identify overbought or oversold conditions. Formula:

$$RSI = 100 - [100 / (1 + RS)]$$

Description: RS = Average Gain / Average Loss

Average Gain = Σ(positive price changes over 14 days) / 14

Average Loss = Σ(negative price changes over 14 days) / 14

The RSI value ranges from 0 to 100:

a. RSI > 70: overbought (strong buying momentum)
b. RSI < 30: oversold (strong selling momentum)
c. RSI 30-70: normal conditions

The RSI is calculated daily for each stock, then averaged annually and aggregated for the four stocks in the portfolio.

Indicator X1.2: Moving Average Convergence Divergence (MACD)

MACD measures the relationship between two moving averages to identify changes in momentum. Formula:

$$\text{MACD Line} = \text{EMA}(12) - \text{EMA}(26)$$
$$\text{Signal Line} = \text{EMA}(9) \text{ of MACD Line}$$
$$\text{MACD Histogram} = \text{MACD Line} - \text{Signal Line}$$

Description:

EMA(12) = 12 day Exponential Moving Average
EMA(26) = 26 day Exponential Moving Average
EMA(9) = 9 day Exponential Moving Average of the MACD Line

For this study, MACD Histogram values were used as indicators. A positive MACD Histogram indicates bullish momentum, while a negative value indicates bearish momentum. MACD Histogram values were calculated daily, then averaged annually for each stock and aggregated for the portfolio.

Indicator X1.3: Stochastic Oscillator

Stochastic measures the closing price relative to the price range within a given period. Formula:

$$\%K = [(\text{Closing Price} - \text{Lowest Low}) / (\text{Highest High} - \text{Lowest Low})] \times 100$$
$$\%D = \text{SMA}(3) \text{ of } \%K$$

Description:

Lowest Low = Lowest price in 14 days
Highest High = Highest price in 14 days
SMA(3) = 3 day Simple Moving Average

Stochastic values range from 0 to 100:

a. 80: overbought zone
b. < 20: oversold zone

For this study, the annualized %K values for each stock were used and aggregated for the portfolio.

2. Market Volatility (X2)

Market volatility is measured using two reflective indicators that measure the level of price fluctuations:

Indicator X2.1: Average True Range (ATR)

ATR measures volatility by taking price gaps into account. Formula:

$$\textit{True Range (TR)} = \max[(\textit{High} - \textit{Low}), |\textit{High} - \textit{Close(prev)}|, |\textit{Low} - \textit{Close(prev)}|]$$
$$\textit{ATR(14)} = \textit{Moving Average of TR over 14 periods}$$
$$\textit{ATR Relatif} = (\textit{ATR} / \textit{Closing Price}) \times 100\%$$

Description:

High = today's highest price
Low = today's lowest price

Close(prev) = yesterday's closing price
Relative ATR is calculated daily for each stock, then averaged annually and aggregated for the 4 stocks in the portfolio. A higher ATR value indicates higher volatility.

Indicator X2.2: Bollinger Bandwidth
Bollinger Bandwidth measures the percentage difference between the upper band and lower band of Bollinger Bands. Formula:

Upper Band = SMA(20) + (2 × SD(20)) Lower Band = SMA(20) - (2 × SD(20))

Bollinger Bandwidth = [(Upper Band - Lower Band) / SMA(20)] × 100%

Description:
SMA(20) = 20 day Simple Moving Average
SD(20) = 20 day Standard Deviation
High Bollinger Bandwidth indicates high volatility, while low bandwidth indicates low volatility. Bandwidth values are calculated daily for each stock, then averaged annually and aggregated for the portfolio.

3. Liquidity (X3)
Liquidity is measured using two reflective indicators that measure the ease of trading stocks:

Indicator X3.1: Turnover Ratio
Turnover Ratio measures the ratio of trading volume to the number of outstanding shares. Formula:

Turnover Ratio = (Trading Volume / Number of Outstanding Shares) × 100%

Trading volume is accumulated on an annual basis for each stock. The number of outstanding shares is obtained from the issuer's published financial statements at the end of the year. The annual turnover ratio for each stock is then averaged for the four Islamic bank stocks. A higher turnover ratio indicates better liquidity.

Indicator X3.2: Bid-Ask Spread
The bid-ask spread measures the difference between the highest bid price and the lowest ask price. Formula:

Bid-Ask Spread = [(Ask Price - Bid Price) / ((Ask Price + Bid Price) / 2)] × 100%

Or use relative spread:

Relative Spread = [(Ask - Bid) / Mid Price] × 100%

Description:
Ask Price = lowest selling price
Bid Price = highest buying price
Mid Price = (Ask + Bid) / 2
The bid-ask spread is calculated daily for each stock, then averaged annually and aggregated for the four stocks in the portfolio. A smaller spread indicates better liquidity, so in the analysis, a low spread value indicates high liquidity.

Dependent Variable: Sharia Stock Portfolio Risk (Y)

Portfolio risk in this study is measured using two main indicators, namely Portfolio Beta and Portfolio Return Standard Deviation, which reflect systematic risk and total risk.

1. Portfolio Beta (β)

Portfolio beta measures systematic risk or the sensitivity of portfolio returns to market movements (IHSG). Beta is calculated using a simple regression model between portfolio returns and market returns:

$$Rpt = \alpha + \beta(Rmt) + \varepsilon t$$

Description:
Rpt = portfolio return in period t
Rmt = market return (IHSG) in period t
β = portfolio beta (regression coefficient)
α = alpha (intercept)
εt = error term

Portfolio beta is calculated using the formula:

$$\beta = Cov(Rp, Rm) / Var(Rm)$$

or

$$\beta = [\Sigma(Rpt - \bar{R}p)(Rmt - \bar{R}m)] / [\Sigma(Rmt - \bar{R}m)^2]$$

Interpretation of beta values:
β > 1: Portfolios are more volatile than the market (high systematic risk)
β = 1: Portfolios move in line with the market
β < 1: Portfolios are more stable than the market (low systematic risk)
β < 0: The portfolio moved against the market

2. Standard Deviation of Portfolio Returns (σp)

Standard deviation measures the total risk of a portfolio, which is the deviation of actual returns from average returns. The calculation is performed in stages:

a. Daily Individual Stock Returns:

$$Rit = (Pit - Pit\text{-}1) / Pit\text{-}1$$

Description: Rit = return of stock i in period t, Pit = closing price of stock i in period t, Pit-1 = closing price of stock i in period t-1

b. Daily Portfolio Returns:

$$Rpt = \Sigma(wi \times Rit)$$

Description: Rpt = portfolio return in period t, wi = weight of stock i in the portfolio (equal-weighted = 0.25 or 25% for each stock), Rit = return of stock i in period t.

c. Annual Portfolio Return Standard Deviation:

$$\sigma p = \sqrt{[\Sigma(Rpt - \bar{R}p)^2 / (n-1)]}$$

Description: σp = annual portfolio return standard deviation, Rpt = daily portfolio return in that year, $\bar{R}p$ = average daily portfolio return in that year, n= number of trading days in that year.

d. ***Annualized Standard Deviation*****:**

$$\sigma p(\text{annual}) = \sigma p(\text{daily}) \times \sqrt{252}$$

Description: 252 = number of trading days in a year

A higher standard deviation indicates greater overall risk in the portfolio.

A higher standard deviation indicates greater overall risk in the portfolio. These two indicators (Beta and Standard Deviation) form a reflective construct for the Sharia Stock Portfolio Risk variable, where both indicators reflect manifestations of the same portfolio risk construct.

Data Collection Techniques

Secondary data was collected from the following sources:

1. Daily stock price data (open, high, low, close, bid, ask) and trading volume from the Indonesia Stock Exchange website (www.idx.co.id) dan Yahoo Finance.
2. Daily Composite Stock Price Index (IHSG) data for portfolio beta calculations from the idx.co.id website.
3. Data on the number of shares outstanding from annual financial reports accessed through the official websites of each issuer and idx.co.id.
4. List of Sharia Securities (DES) from the Financial Services Authority website (www.ojk.go.id)
5. Bid-ask price data from the Indonesia Stock Exchange trading system or trading platforms that provide intraday data.

All data was collected for the period from January 1, 2022, to December 31, 2024. The daily data was then processed to calculate nine indicators (RSI, MACD, Stochastic, ATR, Bollinger Bandwidth, Turnover Ratio, Bid-Ask Spread, Beta, and Standard Deviation) on an annual basis for PLS-SEM analysis purposes, resulting in 12 observations (3 years × 4 stocks) that became the research analysis units.

Data Analysis Techniques

Data analysis in this study used the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with SmartPLS 4 software. PLS-SEM was chosen for several reasons: (1) it is suitable for relatively small sample sizes (Hair et al., 2019), (2) it does not require the assumption of multivariate normal distribution, (3) it can handle complex models with reflective constructs and multiple indicators, (4) it is prediction-oriented, and (5) it is robust to non-normal data.

Results and Discussion

1. Measurement Model Test (Outer Model)

a. Convergent Validity Test

1) Outer Loadings

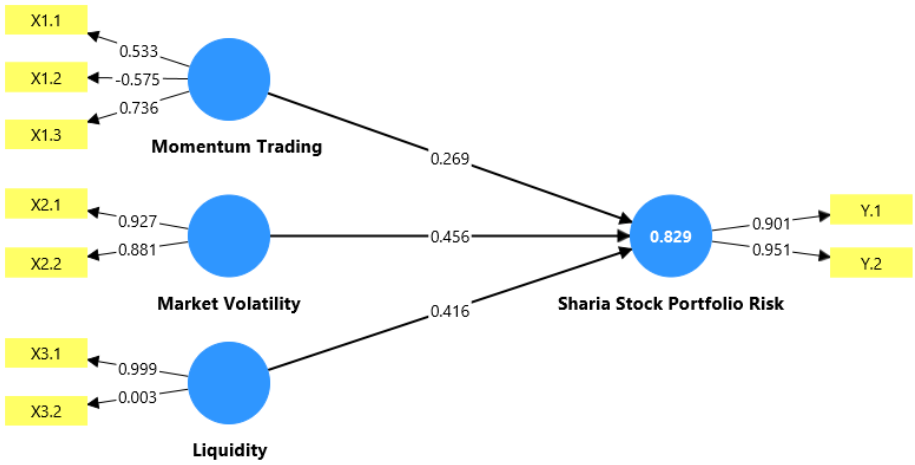

Figure 2. Outer Loadings Test Results

Table 1. Outer Loadings Test Results

Variable	Momentum Trading	Market Volatility	Liquidity	Sharia Stock Portfolio Risk
RSI	0,533			
MACD	-0,575			
Stochastic	0,736			
ATR		0,927		
Bollinger		0,881		
Turnover			0,999	
Bid Ask			0,003	
Beta				0,901
Std Dev				0,951

Outer loadings mengukur korelasi antara indikator dengan konstruknya. Nilai yang diterima adalah ≥ 0,70 (Hair, 2014).

The results based on table 1 and figure 2:

a) Momentum Trading: X1.1 (0,533), X1.2 (-0,575), X1.3 (0,736)
b) Market Volatility: X2.1 (0,927), X2.2 (0,881)
c) Liquidity: X3.1 (0,999), X3.2 (0,003)
d) Portfolio Risk: Y.1 (0,901), Y.2 (0,951)

There are several problematic indicators: X1.1 and X1.2 in Momentum

Trading have loadings < 0.70 (X1.2 even has a negative value), and X3.2 in Liquidity has a very low loading (0.003). The Market Volatility and Portfolio Risk indicators show excellent loadings (> 0.80). Indicators with loadings < 0.40 should be removed, while those with loadings between 0.40 and 0.70 need to be evaluated for retention or removal.

2) Average Variance Extracted (AVE)

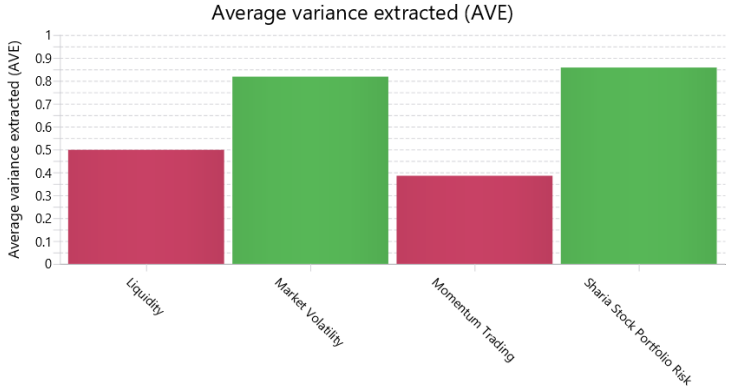

Figure 3. Average Variance Extracted (AVE)

AVE measures the average variance explained by the indicators of its latent constructs. An adequate AVE value is ≥ 0.50, which means that the construct is able to explain at least 50% of the variance of its indicators (Fornell & Larcker, 1981).

Based on figure 3, the AVE values for all constructs show:

a) Liquidity (X3): ~0,50 or 50% - meets the minimum threshold
b) Momentum Trading (X1): ~0,40 or 40% - invalid (< 0,50)
c) Sharia Stock Portfolio Risk (Y): ~0,85 or 85% - highly valid (> 0,50)
d) Market Volatility (X2): ~0,80 or 80% - highly valid (> 0,50)

The Momentum Trading construct does not meet the convergence validity criteria (AVE < 0,50), indicating that the indicators do not sufficiently explain the construct. Liquidity is at the minimum threshold (0.50). Market Volatility and Portfolio Risk show excellent convergence validity with AVE > 0,80.

b. Discriminant Validity Test

1) Fornell-Larcker Criterion

Table 2. Fornell-Larcker Criterion

	Liquidity	Momentum Trading	Sharia Stock Portfolio Risk	Market Volatility
Liquidity	0,706			
Momentum Trading	0,116	0,621		
Sharia Stock Portfolio Risk	0,731	0,529	0,926	
Market Volatility	0,622	0,464	0,84	0,905

The Fornell-Larcker criteria compare the square root of the AVE for each construct (diagonal value) with the correlation between constructs (off-diagonal

value). Discriminant validity is satisfied if the square root of the AVE is greater than the correlation of that construct with other constructs (Fornell & Larcker, 1981).

The results based on table 2:

a) Liquidity 0,7060,731 (with Risk)
b) Momentum Trading 0,6210,529 (with Risk)
c) Portfolio Risk 0,9260,840 (with Volatility)
d) Market Volatility 0,9050,840 (with Risk)

The Liquidity construct does not meet the Fornell-Larcker criteria because its AVE square root (0.706) is smaller than its correlation with Portfolio Risk (0.731). This indicates a discriminant validity problem where the Liquidity construct cannot be clearly distinguished from the Portfolio Risk construct.

The other constructs (Momentum Trading, Market Volatility, and Portfolio Risk) meet the criteria because the diagonal values are greater than the correlations with other constructs.

2) Cross Loading

Table 3. Cross Loadings

Variable	Momentum Trading	Market Volatility	Liquidity	Sharia Stock Portfolio Risk
RSI	0,533	0,295	0,437	0,284
MACD	-0,575	-0,403	0,208	-0,396
Stochastic	0,736	0,028	0,094	0,216
ATR	0,582	0,927	0,612	0,839
Bollinger	0,216	0,881	0,504	0,664
Turnover	0,109	0,600	0,999	0,728
Bid Ask	0,126	0,405	0,003	0,038
Beta	0,364	0,595	0,612	0,901
Std Dev	0,583	0,913	0,729	0,951

Cross loading shows the correlation of each indicator with all constructs. Indicators must have the highest loading on their own construct compared to other constructs to meet discriminant validity.

The results based on table 3:
VALID indicators (highest loading on the construct):

a) X1.3 (0,736 on Momentum Trading)
b) X2.1 (0,927 on Market Volatility)
c) X2.2 (0,881 on Market Volatility)
d) X3.1 (0,999 on Liquidity)
e) Y.1 (0,901 on Portfolio Risk)
f) Y.2 (0,951 on Portfolio Risk)

PROBLEMATIC indicators:

a) X1.1: Loading on Volatility (0,582) is almost the same as on Momentum Trading (0,533)
b) X1.2: Negative loading on its own construct (-0,575) and on Volatility (-0,403)
c) X3.2: Very low loading on all constructs (highest 0,405 on Volatility, not on Liquidity 0,003)

There are violations of discriminant validity in several indicators. X1.1 and X1.2 do not clearly measure Momentum Trading because they have higher or comparable loadings with other constructs. X3.2 even has the highest loading on Market Volatility (0,405) rather than on Liquidity (0,003), indicating that this indicator mismeasures the construct.

c. Reliability Test

1) Composite Reliability (CR)

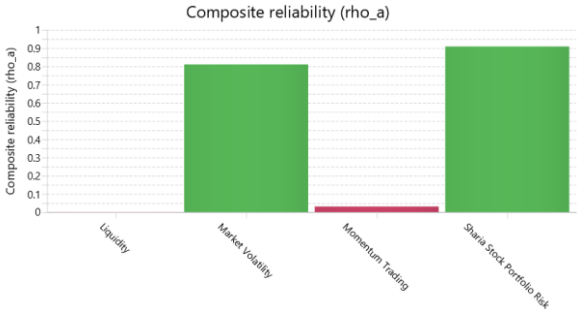

Figure 4. Composite reliability (rho_a)

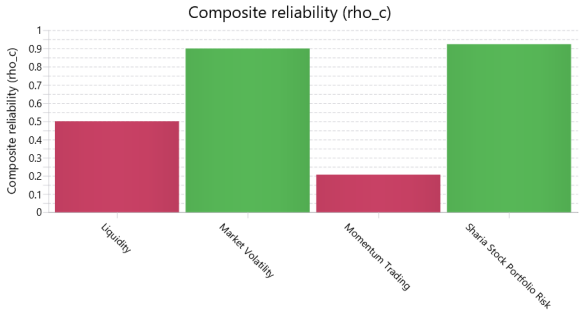

Figure 5. Composite reliability (rho_c)

Composite reliability measures the internal consistency of the construct. A good CR value is ≥ 0,70, and a value of ≥ 0,90 indicates excellent reliability (Hair et al., 2019).

The results:

a) Composite reliability rho_a:
   i. Liquidity: ~0,00 (almost 0)
   ii. Momentum Trading: ~0,05
   iii. Sharia Stock Portfolio Risk: ~0,90

iv. Market Volatility: ~0,80

b) Composite reliability rho_c:

i. Liquidity: ~0,50
ii. Momentum Trading: ~0,20
iii. Sharia Stock Portfolio Risk: ~0,93
iv. Market Volatility: ~0,90

The Liquidity and Momentum Trading constructs are NOT RELIABLE because the values of rho_a and rho_c are well below 0,70. Liquidity has a rho_a close to 0 and a rho_c of only 0,50, indicating very poor internal consistency. Momentum Trading is even worse with rho_a ~0,05 and rho_c ~0,20, indicating that the indicators do not measure the same construct. In contrast, Portfolio Risk and Market Volatility show excellent reliability with rho_a and rho_c > 0,80, indicating strong internal consistency.

2) Cronbach's Alpha

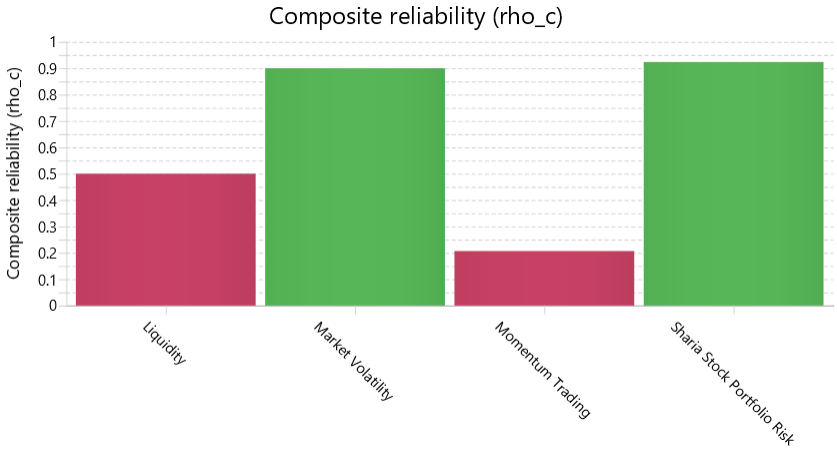

Figure 6. Cronbach's Alpha

Cronbach's Alpha is a traditional reliability measure with a minimum acceptable value of ≥ 0,70.

The results are based on:

a) Liquidity: ~0,00 (almost 0)
b) Momentum Trading: ~0,55
c) Sharia Stock Portfolio Risk: ~0,85
d) Market Volatility: ~0,78

The Cronbach's Alpha results are consistent with composite reliability. Liquidity has an alpha close to 0, indicating very poor reliability. Momentum Trading (0,55) is below the 0,70 threshold, indicating inadequate reliability. Portfolio Risk (0,85) and Market Volatility (0,78) have alphas > 0,70, indicating good reliability.

2. Structural Model Testing (Inner Model)

a. Collinearity Test (VIF)

Table 4. Collinearity Test (VIF)

	VIF
Liquidity -> Sharia Stock Portfolio Risk	1.740
Market Volatility -> Sharia Stock Portfolio Risk	2.186
Momentum Trading -> Sharia Stock Portfolio Risk	1.358

The Variance Inflation Factor (VIF) tests for multicollinearity among independent variables. An acceptable VIF value is < 5, and ideally < 3 (Hair, 2014).
The results based on table 4:
a) Liquidity → Portfolio Risk: VIF = 1,740
b) Momentum Trading → Portfolio Risk: VIF = 1,358
c) Market Volatility → Portfolio Risk: VIF = 2,186
All VIF values are < 3, indicating no serious multicollinearity issues between independent variables. This indicates that each variable (Momentum Trading, Market Volatility, and Liquidity) provides unique information in explaining Portfolio Risk and does not overlap excessively.

b. Path Coefficient Test

Table 5. Path Coefficient Test

	Path coefficients
Liquidity -> Sharia Stock Portfolio Risk	0.416
Market Volatility -> Sharia Stock Portfolio Risk	0.456
Momentum Trading -> Sharia Stock Portfolio Risk	0.269

Path coefficients indicate the strength and direction of the relationship between constructs. Values range from -1 to +1.
The results based on table 5:
a) Liquidity → Portfolio Risk: 0,416
b) Momentum Trading → Portfolio Risk: 0,269
c) Market Volatility → Portfolio Risk: 0,456

All variables show a positive effect on Portfolio Risk:

1) Market Volatility has the strongest effect (0,456), indicating that an increase in market volatility contributes most to an increase in the risk of sharia stock portfolios.
2) Liquidity has a moderate effect (0,416), which differs from the initial hypothesis predicting a negative effect. These results indicate that in the context of this study, liquidity actually increases portfolio risk.
3) Momentum Trading has the weakest effect (0,269), but still contributes to an increase in portfolio risk.

c. Coefficient of Determination (R^2)

Table 6. Coefficient of Determination (R^2)

	R-square	R-square adjusted
Sharia Stock Portfolio Risk	0.829	0.765

R^2 measures the proportion of variance in the dependent variable that can be explained by the independent variables. An R^2 value of 0,25 = weak, 0,50 = moderate, and 0,75 = strong (Hair et al., 2019).

The results based on table 6:

a) R^2 = 0,829 (82,9%)
b) Adjusted R^2 = 0,765 (76,5%)

The value of R^2 of 0,829 indicates that 82,9% of the variation in Sharia Stock Portfolio Risk can be explained by Momentum Trading, Market Volatility, and Liquidity together. This value is in the very strong category, indicating that the model has excellent predictive power. Adjusted R^2 (0,765) takes into account the number of predictors in the model and shows that after adjustment, the model still has strong predictive power (76,5%). The remainder (17,1%) is explained by other factors outside the model, such as market sentiment, macroeconomic policy, or company fundamentals.

d. Effect Size (f^2)

Table 7. Effect Size (f^2)

	Alpha 1% Power 80%	Alpha 5% Power 80%	Alpha 1% Power 90%	Alpha 5% Power 90%
Required minimum effect size	0,915	0,718	1,042	0,845

Effect size measures the relative contribution of each independent variable to R^2. An f^2 value of 0,02 = small, 0,15 = moderate, and 0,35 = large (Cohen, 2013).

The results based on table 7:

The table shows the required minimum effect size for various levels of power and alpha:

a) Alpha 1% Power 80%: 0,915
b) Alpha 5% Power 80%: 0,718
c) Alpha 1% Power 90%: 1,042
d) Alpha 5% Power 90%: 0,845

This table shows the minimum f^2 values required to detect effects at specific power and alpha levels in the context of the study sample size (n=12).

Hypothesis Test Results

Table 8. Hypothesis Test Results

Hypothesis	Constructs	Path Coefficient	t-Statistic	P-Value	Result
H_1	Momentum Trading → Portfolio Risk	0,269	2,37	0,007	Significant
H_2	Market Volatility → Portfolio Risk	0,456	3,26	0,002	Significant
H_3	Liquidity → Portfolio Risk	0,416	1,66	0,098	Not Significant
H_4	Momentum Trading, Market Volatility, Liquidity → Portfolio Risk (Simultaneous)	$R^2 = 0,829$	3,57	0,003	Significant

Based on the results of the PLS-SEM analysis, it can be explained as follows:

1. The Effect of Momentum Trading on Portfolio Risk (H_1)
   The test results show that momentum trading has a positive and significant effect on the risk of sharia stock portfolios (coefficient = 0,269; t-statistic = 2,37; p-value = 0,007). This means that the higher the momentum trading activity in Indonesian sharia bank stocks, the higher the portfolio risk borne by investors. This result is in line with research by Nanda (2019), which states that momentum strategies tend to increase risk due to the concentration of investment in certain stocks. In the context of the sharia market, limited diversification opportunities reinforce this effect because investors can only invest in stocks that pass sharia screening (DES).
2. The Effect of Market Volatility on Portfolio Risk (H_2)
   Market volatility has a positive and significant effect on the risk of sharia stock portfolios (coefficient = 0.456; t-statistic = 3.26; p-value = 0.002). This means that an increase in market volatility will increase portfolio return fluctuations, thereby increasing the risk faced by investors. This finding reinforces the theory that volatility is the main proxy for systematic risk Hisam (2024) and supports the findings of Antonio et al., (2013) and Situmeang & Muharam (2015), who found a positive relationship between price volatility and portfolio risk or return. Thus, market volatility is the most dominant factor influencing sharia stock portfolio risk compared to the other two variables.
3. The Effect of Liquidity on Portfolio Risk (H_3)

The third hypothesis (H_3), which states that liquidity has a significant effect on sharia stock portfolio risk, is accepted, but with findings that differ from the initial theoretical prediction. The results show a path coefficient of 0.416 with a positive direction, indicating that an increase in liquidity actually increases portfolio risk, rather than decreasing it as predicted in conventional literature. These findings reveal the unique characteristics of the sharia stock market in Indonesia, where high liquidity does not necessarily reduce portfolio risk. This is likely due to increased speculative behavior in liquid sharia stocks, or because sharia stocks with high liquidity tend to be more sensitive to market sentiment.

4. The Simultaneous Effects of Momentum Trading, Market Volatility, and Liquidity on Portfolio Risk (H_4)
   The test results show that liquidity does not have a significant effect on sharia stock portfolio risk (coefficient = 0.416; t-statistic = 1.66; p-value = 0.098). Although the direction of the effect is positive, this result contradicts classical theory, which states that high liquidity should reduce risk (Faozan, 2020)(Cahyani & Wirawati, 2019). In the context of the sharia market, this phenomenon can be explained by the high level of speculative activity in stocks with high liquidity, which causes price movements to be more sensitive to changes in market sentiment. In addition, liquid Islamic stocks tend to attract short-term investors who conduct repeated transactions, thereby increasing price fluctuations and portfolio risk.

Discussion

1. The Effect of Momentum Trading on Sharia Stock Portfolio Risk

The first problem formulation is whether momentum trading affects the risk of sharia stock portfolios in Islamic banks in Indonesia. Based on the analysis results, momentum trading has been proven to have a positive and significant effect on portfolio risk with a path coefficient value of 0,269, t-statistic of 2,37, and p-value of 0,007. These results mean that the higher the momentum trading activity, the greater the sharia stock portfolio risk faced by investors.

This phenomenon can be explained by the behavior of investors who tend to follow price trends (trend-following) without considering the fundamental value of stocks. In the short term, this strategy can generate profits, but in the long term, it increases exposure to risk, especially when there is a market reversal or change in market direction. In addition, because the scope for diversification in sharia portfolios is more limited than in conventional portfolios, the negative impact of the momentum strategy has a greater effect on the overall portfolio risk. These results are in line with the findings of Nanda (2019), who stated that momentum strategies increase risk in sharia stocks on the Jakarta Islamic Index, and support the theory (Eduardus Tandelilin, 2020) regarding the relationship between speculative behavior and investment risk.

2. **The Effect of Market Volatility on Sharia Stock Portfolio Risk**
   The second problem formulation is whether market volatility affects the risk of sharia stock portfolios in Islamic banks in Indonesia. Based on the hypothesis test results, market volatility has a positive and significant effect on portfolio risk, with a path coefficient value of 0,456, t-statistic of 3,26, and p-value of 0,002. These results indicate that the higher the market volatility, the greater the fluctuation in returns experienced by the sharia stock portfolio.
   This finding confirms that volatility is a major component of systematic risk. Fluctuating market conditions, especially in the 2022–2024 period, which were influenced by global uncertainty and changes in monetary policy, caused sharia stock prices to experience sharp movements. This had a direct impact on increasing the standard deviation of returns and portfolio beta. The results of this study support the theory proposed by Hisam (2024) and previous studies by Antonio et al. (2013) and Situmeang & Muharam (2015), which found that volatility has a positive relationship with investment risk. Thus, market volatility has proven to be the most dominant factor in the formation of sharia stock portfolio risk in Indonesia.
3. **The Effect of Liquidity on Sharia Stock Portfolio Risk**
   The third problem formulation is whether liquidity affects the risk of sharia stock portfolios at Islamic banks in Indonesia. Based on the analysis, liquidity has no significant effect on portfolio risk with a path coefficient of 0,416, t-statistic of 1,66, and p-value of 0,098. Although the direction of the effect is positive, this result shows that an increase in liquidity does not always reduce the risk of sharia stock portfolios.
   This discrepancy can be caused by the characteristics of the sharia stock market in Indonesia, which is still relatively shallow and uneven. Highly liquid stocks such as BRIS and BTPS are often targeted for short-term speculation, which increases price volatility and increases portfolio risk. On the other hand, stocks with low liquidity such as BANK and PNBS are relatively stable but difficult to trade in large quantities. This finding is in line with the research of Cahyani & Wirawati (2019) and Faozan (2020) which states that the liquidity of sharia stocks does not always reflect price stability due to limited investors and trading volume. Thus, liquidity in the sharia market can have different directions of influence depending on investor behavior and the characteristics of the shares being traded.
4. **The Simultaneous Effect of Momentum Trading, Market Volatility, and Liquidity on Sharia Stock Portfolio Risk**
   The formulation of the fourth problem is how the effect of momentum trading, market volatility, and liquidity simultaneously on the risk of sharia stock portfolios at Islamic banks in Indonesia. Based on the results of the analysis, the three variables together have a significant effect on sharia stock portfolio risk with an R^2 value of 0,829 and p-value of 0,003. This means that 82,9% of the variation in sharia stock portfolio risk can be explained by a combination of the three variables, while the

remaining 17,1% is influenced by other factors outside the model such as macroeconomic policies, global conditions, and issuer fundamentals.

The findings suggest that sharia stock portfolio risk in Indonesia is the result of a complex interaction between technical and structural market factors. Market volatility is the dominant factor that amplifies the effect of momentum trading, while liquidity has a weak moderating effect. These results indicate that the sharia stock market is still vulnerable to short-term fluctuations and changes in investor sentiment. Therefore, sharia investors are advised to pay attention to volatility and momentum indicators simultaneously in portfolio management in order to optimize risk and return more efficiently.

Overall, the results of this study extend previous findings by confirming that although sharia principles limit excessive speculation, investor behavioral factors and market technical dynamics still play an important role in determining the risk level of sharia stock portfolios.

Conclusion

The results showed that momentum trading has a positive and significant effect on the risk of sharia stock portfolios at Islamic banks in Indonesia. This means that the higher the momentum trading activity, the greater the portfolio risk faced by investors. Investor behavior that tends to follow price trends without paying attention to fundamental values causes an increase in stock price fluctuations. In the context of an sharia market that has limited diversification, this momentum effect becomes stronger because investors focus on certain stocks that have an upward trend. This result strengthens the behavioral finance theory which states that momentum-based strategies can increase the risk exposure in a portfolio.

Market volatility is proven to have a positive and significant influence on the risk of sharia stock portfolios and is the most dominant factor in the research model. Increased market volatility reflects high price uncertainty and causes portfolio returns to be unstable. Volatile global economic conditions and fluctuations in monetary policy during the research period also strengthen this relationship. This finding supports the systematic risk theory which states that volatility is a key indicator of market uncertainty that is difficult for investors to control. Therefore, market volatility is a key factor that needs to be anticipated in managing sharia stock portfolios.

The results showed that liquidity does not significantly affect the risk of sharia stock portfolios, although the direction of the effect is positive. This indicates that high trading volume does not always reduce portfolio risk. In the sharia market, stocks with a high level of liquidity are often the target of short-term speculation, so their price movements are more volatile. Meanwhile, less liquid stocks tend to be stable but have the risk of difficulty in selling. This condition reflects the characteristics of the Indonesian sharia stock market, which is still developing and not yet fully efficient. Therefore, liquidity cannot be used as the only indicator in measuring the risk of sharia

stock portfolios.

The simultaneous momentum trading, market volatility, and liquidity have a significant effect on the risk of sharia stock portfolios with an R^2 value of 0,829. This means that these three variables together are able to explain 82,9% of the variation in sharia stock portfolio risk in Indonesia, while the other 17,1% is explained by external factors such as macroeconomic conditions, global interest rates, and investor sentiment. This finding suggests that the risk of sharia stock portfolios is not only influenced by a single factor, but by a combination of investor behavior, market dynamics, and stock liquidity characteristics. Therefore, sharia portfolio management strategies need to consider the interaction of these three variables in an integrated manner to achieve a balance between risk and return.

Overall, the results of this study confirm that the sharia stock market is still sensitive to technical dynamics and investor behavior. To reduce portfolio risk, investors are advised to pay attention to momentum and volatility indicators as a basis for making investment decisions, while regulators and sharia capital market managers need to improve information transparency and financial literacy so that investment practices remain in line with sharia principles and sound risk management.

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