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Systemic Risk Analysis of Some Sharia Share in Jakarta Islamic Index

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Abstract

When investing, investors tend to only pay attention to the Risk of the value owned by an individual stock (Value at Risk) when there is a risk of another, namely systemic Risk. Systemic Risk is the Risk that has the overall effect on the Risk of another. Systemic Risks of Islamic stock issues are discussed in this study. This study analyzed whether there is any significant relationship between individual Risk (Value at Risk) in Islamic stocks with systemic Risk. Systemic Risk is calculated using the Conditional Value at Risk (CoVaR) with an estimated Quantile Regression Model (QRM). Based on the data processing results, the stock with the highest Value at Risk is PT Astra Agro Lestari, Tbk (AALI), whereas the stocks with the highest systemic risk value are PT. Astra International, Tbk (ASII). This indicates no significant relationship between the Value at Risk and Systemic Risk.

Keywords: Islamic stocks, VaR, CoVaR, Systemic Risk, QRM

1. Introduction

The development of the country's economy and capital market holds two roles or essential functions in investing (IDX, 2017). First, the capital market acts as a means to obtain funding for business activities or fundraising facilities from the community as an investor needed by the company (issuer) for its operational activities. Thus, the funds collected from the community (investor) will be used by the company (issuer) in its operational activities (Daugaard, 2020; Vanclay & Hanna, 2019). The investment fund can be used for business development, product development, improving capital structure, and other company operational activities. Second, the capital market can be an alternative investment activity on financial instruments, such as bonds, stocks, mutual funds, and other securities instruments for the community, in addition to banking and other financial institutions. With the existence of the capital market, the community can carry out investment activities while still considering the Risk and return that must be borne by the instruments offered. Shares owned by investors in their portfolio structures are more chosen by paying attention to returns and risks invested with deployment, more considering the low correlation of shares individually (Trimulato et al., 2022).

One of the critical decisions faced by investors in choosing an investment is the decision to invest with the sharia and conventional system. As it is stated by Hersugondo et al. (2020), the decision to invest in the capital market is caused by three factors: firstly, the capital market is an alternative way of funding besides banking. Secondly, the capital market allows investors to have various investment options that suit their risk preferences. Thirdly, investment in securities has high liquidity to enable efficient allocation of funds. Two things are essential for investors to invest in stocks, i.e., returns and risks (Hersugondo et al., 2020). Many investment options include savings, mutual funds, bonds, supplies, etc. There are more and more new players in the investment market, significantly investing in the stock market. There are two investment options on the stock exchange: the conventional stock market and the Islamic stock market. In recent years, sharia stocks have increased. This can be seen from the JII index (Jakarta Islamic Index) development, which increased by 58.38% in 2007 compared to 2006. The percentage increase in JII was higher than the LQ45 and JCI, which only amounted to 52.58% and 52.08% (IDX, 2017).

When investing, investors expect the maximum profit. In general, investors make investments by avoiding Risk aversion. Every investment certainly has risks that cannot be avoided but can only be minimized. So far, investors have tended to only pay attention to the risk value of an individual stock, even though another risk has an overall effect on other chances and even affects the financial system, namely systemic Risk. Systemic Risk is how the Risk of one institution affects the Risk of other institutions as a whole. There are many ways to calculate systemic Risk. Adrian and Brunnermeier (2011) proposed a new method: Conditional Value at Risk (CoVaR), in which systemic Risk is calculated by identifying the risks contained in a system through the individual risk value of an institution. In this study, systemic Risk will be analyzed in several Islamic stocks in the Jakarta Islamic Index (JII).

2. Literature Review

2.1. Stock Return

Return is the result obtained from a stock investment during a specific period. Actual Stock returns can be in the form of *expected* returns and returns. The real return is the return that has occurred *return* from the stock market index can be calculated by forming the *ln* of the index value ratio as follows:

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \tag{1}$$

2.2. Quantiles

If the cumulative distribution function of X is continuous and does not decrease, then the position of X has an inverse function F^{-1}. For every p between 0 and 1, $F^{-1}(p)$ is called the p-quantile or 100th-percentile. The probability of a continuous cumulative distribution function X falling under the p-quantile is exactly *p*. The plot of the cumulative distribution function is continuously increasing, and for all $p, 0 < p < 1. p = 0.5$, then there is a p-quantile $F^{-1}(p)$ single and $P\{X < F^{-1}(p)\} = P\{X \leq F^{-1}(p)\} = p$.

The median is the 50% percentile or $0.5 - quantile$. The 25% and 75% percentiles are called the first and third quartiles, while the median is the second quartile. The three quartiles divide the range of a continuous random variable into four groups in equal proportions, the 20%, 40%, 60%, and 80% percentiles are called *quantiles*, and the 10%, 20%., and 90% percentiles are called *deciles*. *Quantiles* can also be interpreted as a value that divides data into several equal parts (Ruppert, 2004).

2.2.1. Quantiles Estimation

Quantile Estimation is an estimate with a *nonparametric*. There are two types of calculations in the quantile method, the first is by using empirical quantiles directly, and the second is by using *Quantile Regression* (Tsay, 1951). *p*th quantile $\hat{Q}^{(P)}$ from cdf *F* is the minimum of the value y so that $F(y) \geq p \; for \; 0 \leq p \leq 1$. Function $\hat{Q}^{(P)}$ as a function of p is called a quantile function. Given sample $y1, \ldots, yn$, sample *p*th quantile $\hat{Q}^{(P)}$ is the corresponding *p*th quantile cdf $\hat{F}$; $\hat{Q}^{(P)}$ is a sample of the quantile function. Quantile as a solution to minimize $\hat{Q}^{(P)}$ will produce:

$$\min q \{(1-p) \textstyle\sum_{y_i} | y_i - q| + p \sum_{y_{i \geq q}} | y_i - q|\} \tag{2}$$

2.2.2. Quantiles Reggresion Model (QRM)

Quantile Regression Models or quantile regression models are statistical techniques used to predict the relationship between response and explanatory variables in certain conditional quantile functions**.** As with the least squares method, which minimizes the sum of the squared errors and predicts the model using the average dependent process, quantile regression minimizes the unsymmetrical weighted absolute errors and indicates the conditional quantile function on data distribution. Quantile regression is generally instrumental when analyzing a specific part of a conditional distribution. For example, the median or lower quartile of a conditional distribution is in the upper quartile. The quantile regression method does not require parametric assumptions (Buhai, 2011). For a random variable X with a probability distribution function.

$$F(x) = P(X \leq x) \tag{3}$$

The pth quantile of X is defined as the inverse function

$$Q(p) = inf\{x, F(x) \geq p\} \tag{4}$$

Following Koenker and Bassett (1978), the quantile regression equation is as follows:

$$y_i = \beta_0^{(p)} + \beta_1^{(p)} x_i + \varepsilon_i^{(p)} \tag{5}$$

with 0<p<1 representing p-quantile, and is the equation of the conditional quantile function.

$$Q^{(p)}(y_i|x_i) = \beta_0^{(p)} + \beta_1^{(p)} x_i \quad , \quad 0 < p < 1 \tag{6}$$

2.3. Value at Risk

Value at Risk (*VaR*) measures the level of Risk of investment loss. *Value at Risk* is generally defined as the maximum possible loss for a certain position within the *confidence level* time *horizon* (Manganelli & Engle, 2021). The random variable's value at Risk (VaR) is the loss value x at the confidence level $1 - p, 0 < p < 1$ is $1 - p$ quantile of the total loss value distribution *F*.

$$VaR_p = F^{-1}(1-p) \tag{7}$$

Or

$$\Pr(X \le VaR_p) = 1 - p \tag{8}$$

$$\Pr(X > VaR_p) = p \tag{9}$$

2.4. Systemic Risk

Adrian and Brunnermeier (2011) proposed a new method for measuring systemic Risk: *CoVaR* (Conditional Value at Risk). This method is based on the Value at Risk (*VaR*) of a system and the Value at Risk (*VaR*) of an individual stock.

2.4.1. Systemic Risk Using the Conditional Value at Risk (CoVaR) Method

Calculating systemic Risk in this thesis uses the CoVaR method introduced by Adrian and Brunnermeier (2011) with Quantile Regression Models (QRM) estimates. First Definition (Adrian and Brunnermeier, 2010) $CoVaR_p^{j|i}$ defined as the VaR of institution j (financial system) depending on a state $\mathbb{C}\left(X^i\right)$ from an institution i. $CoVaR_p^{j|i}$ implicitly defined by the p-quantile of the conditional probability distribution.

$$\Pr(X^j \le CoVaR_p^{j|\mathbb{C}(X^i)} | \, \mathbb{C}(X^i)) \tag{10}$$

I denote Islamic stocks in this study, while j denotes the Jakarta Islamic Index (JII). Based on Adrian and Brunnermeier (2011), the quantile regression equation used is as follows:
Sharia stock return is expressed in the equation:

$$X_t^i = \alpha^i + \beta^i M_{t-1} + \varepsilon_t^i \tag{11}$$

Return JII is expressed in the equation:

$$X_t^{JII} = \alpha^{JII} + \beta^{JII} M_{t-1} + \varepsilon_t^{JII} \tag{12}$$

And

$$X_t^{JII} = \alpha^{JII|i} + \beta^{JII|i} M_{t-1} + \gamma^{JII|i} X_t^i + \varepsilon_t^{JII|i} \tag{13}$$

With:

X_t^i : Sharia stock return *i* in period *t*
X_t^{JII} : Return Jakarta Islamic Index in period *t*
α, β : Quantile regression parameters
M_{t-1} : Jakarta Islamic Index lag return vector period before *t*

Coefficient value α^i, β^i, α^{JII}, β^{JII} Obtained from equations (11) and (12) then, these values can be used to predict Value at Risk (VaR), which is expressed in the following equation efficiently:

$$VaR_t^i\,(p) = \hat{\alpha}^i + \hat{\beta}^i M_{t-1} \tag{14}$$

And

$$VaR_t^{JII}(p) = \hat{\alpha}^{JII} + \hat{\beta}^{JII} M_{t-1} \tag{15}$$

With:

$VaR_t^i\,(p)$: *VaR* sharia stock *i* in the p-th quantile in period *t*
$VaR_t^{JII}(p)$: *VaR* Jakarta Islamic Index in the *p-th* quantile in the period *t*

Wich one:

$$\hat{\beta}^i = \frac{n\sum M_{t-1}X_t^i - (\sum M_{t-1})(\sum X_t^i)}{n\sum M_{t-1}{}^2 - (\sum M_{t-1})^2} \quad (16)$$

$$\hat{\alpha}^i = \bar{X}_t^i - \hat{\beta}^i \bar{M}_{t-1} \quad (17)$$

And

$$\hat{\beta}^{JII} = \frac{n\sum M_{t-1}X_t^{JII} - (\sum M_{t-1})\left(\sum X_t^{JII}\right)}{n\sum M_{t-1}{}^2 - (\sum M_{t-1})^2} \quad (18)$$

$$\hat{\alpha}^{JII} = \bar{X}_t^{JII} - \hat{\beta}^{JII} \bar{M}_{t-1} \quad (19)$$

With:

n : Amount of Data

$\bar{X}_t^i$: The average return of stock *i* in the period

$\bar{X}_t^{JII}$: The average return of the Jakarta Islamic Index in the period *t*

$\bar{M}_{t-1}$: The average lag return of the Jakarta Islamic Index for the period before *t*

Furthermore, to calculate the VaR (Value at Risk) of Islamic stocks, VaR (Value at Risk) of the Jakarta Islamic Index (JII) stock index, and CoVaR (Conditional Value at Risk) of Islamic stocks, according to the method used by Adrian and Brunnermeier (2011) so the authors use quantile regression with a confidence interval in the first quantile, namely 99%. The calculation of the Conditional Value at Risk (CoVaR) uses a coefficient $\alpha^{JII|i}$, $\beta^{JII|i}$, $\gamma^{JII|i}$, which is obtained from equation (13), which is as follows:

$$CoVaR_t^i(p) = \hat{\alpha}^{JII|i} + \hat{\beta}^{JII|i} M_{t-1} + \hat{\gamma}^{JII|i} VaR_t^i(p) \quad (20)$$

With:

$CoVaR_t^i(p)$: *CoVaR* sharia stock *i* in the *p*-th quantile in period *t*

$VaR_t^i(p)$: *VaR* sharia stock *i* in the *p*-th quantile in period *t*

Wich one:

$$\hat{\beta}^{JII|i} = \frac{(n\sum M_{t-1}X_t^{JII} - \sum M_{t-1}\sum X_t^{JII})(n\sum X_t^{i\,2}(\sum X_t^i)^2) - (n\sum M_{t-1}X_t^i \sum M_{t-1}\sum X_t^i)(n\sum X_t^i X_t^{JII} - \sum X_t^i \sum X_t^{JII})}{(n\sum M_{t-1}{}^2 - (\sum M_{t-1})^2)(n\sum X_t^{i\,2}(\sum X_t^i)^2) - (n\sum M_{t-1}X_t^i - \sum M_{t-1}\sum X_t^i)^2} \quad (21)$$

$$\hat{\gamma}^{JII|i} = \frac{(n\sum X_t^i X_t^{JII} - \sum X_t^i \sum X_t^{JII})(n\sum M_{t-1}{}^2 \sum M_{t-1}{}^2) - (n\sum M_{t-1}X_t^{JII} - \sum M_{t-1}\sum X_t^{JII})(n\sum M_{t-1}X_t^i - \sum M_{t-1}\sum X_t^i)}{(n\sum M_{t-1}{}^2 - (\sum M_{t-1})^2)(n\sum X_t^{i\,2}(\sum X_t^i)^2) - (n\sum M_{t-1}X_t^i - \sum M_{t-1}\sum X_t^i)^2} \quad (22)$$

$$\hat{\alpha}^{JII|i} = \frac{\sum X_t^{JII} - \hat{\beta}^{JII|i}\sum M_{t-1} - \hat{\gamma}^{JII|i}\sum X_t^i}{n} \quad (23)$$

The calculation of systemic Risk is carried out after obtaining the Value at Risk value of sharia stocks ($VaR_t^i\,(p)$), Value at Risk Jakarta Islamic Index stock index ($VaR_t^{JII}(p)$), and Conditional Value at Risk of Islamic stocks ($VaR_t^i\,(p)$). Adrian and Brunnermeier (2011) define $\Delta CoVaR^i$ is the difference between the VaR of the financial system (j) which depends on the conditions in an institution i and the VaR of the financial system (j).

$$\Delta CoVaR^i = CoVaR^i - VaR^j \quad (24)$$

Based on equation (24), the calculation of systemic Risk is as follows:

$$\Delta CoVaR_t^i\,(p) = CoVaR_t^i(p) - VaR_t^{JII}(p) \quad (25)$$

With:

$\Delta CoVaR_t^i\,(p)$: systemic Risk of sharia stock *i* in the *p*-th quantile in period *t*

$CoVaR_t^i\,(p)$: *CoVaR* sharia stock *i* in the *p*-th quantile in period *t*

$VaR_t^{JII}(p)$: *VaR* Jakarta Islamic Index in the *p*-th quantile in the period *t*

2.5. Model Validation

Model validation is the process of checking the feasibility of a model. Model validation is done to ensure whether a model is feasible or not to be used. Model validation can be done with the Likelihood Ratio (LR) Test. The stages in model validation with the Likelihood Ratio LR Test are as follows: 1). Determine the number of samples or total observations (T), 2). Calculate the value of V (complete failure or absolute exception) during the observation period, 3). Determine the value of α or level of confidence, and 4). Calculating the Loglikelihood Ratio (LR) value with the following equation:

$$LR = -2\ln[\alpha^{T-V}(1-\alpha)^{V}] + 2\ln\left[\left[1-\left(\frac{V}{T}\right)\right]^{T-V}\left(\frac{V}{T}\right)^{V}\right] \quad (26)$$

With:

LR : Loglikelihood Ratio
α : confidence level
T : the amount of data observed
V : the amount of error data

The Log Likelihood Ratio (LR) value is compared to the critical chi-square with a degree of freedom of 1 (the number of independent variables involved) at the expected significance level. If the LR is greater than the critical chi-squared, then the risk calculation model is inaccurate, and vice versa. If the LR is less than the essential chi-squared, then the risk calculation model is accurate (Manganelli & Engle, 2021).

3. Materials and Methods

3.1. Materials

The data sources in this study are books, financial journals, previous research, and financial reports from companies sampled in this study, namely companies that are members of the LQ45 joint stock and registered on JII in 2020. Data collection uses fluctuating stock price movements.

3.2. Methods

In this research, we will use an analyzed relationship between individual Risk (Value at Risk) of Islamic stocks and Systemic Risk. Systemic Risk is calculated using the Conditional Value at Risk (CoVaR) with an estimated Quantile Regression Model (QRM).

4. Results

4.1. Stock Return Value

The calculation of stock returns follows equation (2). The following is the result of calculating returns using one of the observed stocks, namely ASII:

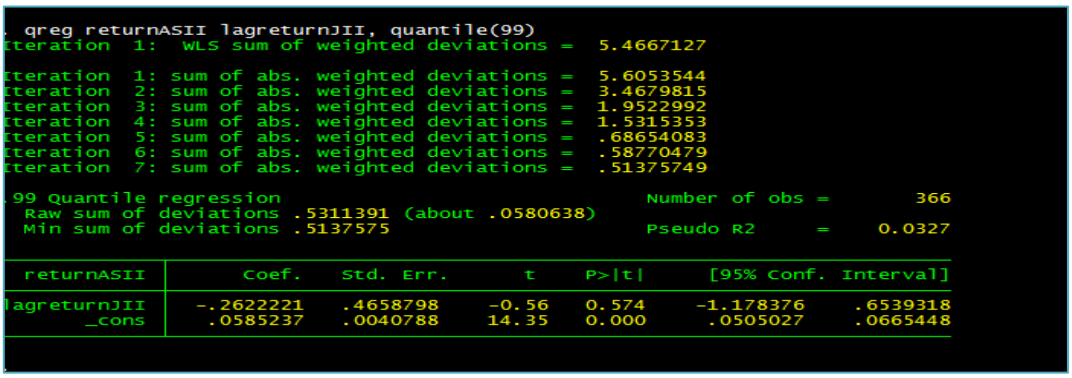
$$\text{Return}_{5\text{january}} = \ln\left(\frac{\text{close 5 januari}}{\text{close 4 januari}}\right) = \ln\left(\frac{3550}{3530}\right) = 0.0564973$$

Calculation of other stock returns using the same method.

4.2. Quantile Regression Models (QRM) Estimation

4.2.1. Calculation of Share Value at Risk (VaR)

Before calculating the stock VaR, estimate the Quantile Regression Models (QRM) parameters following equation (11). The following is an example of estimating the QRM parameter for PT. Astra International, Tbk (ASII) uses STATA 10 software:


```
. qreg returnASII lagreturnJII, quantile(99)
Iteration  1:  WLS sum of weighted deviations =  5.4667127

Iteration  1: sum of abs. weighted deviations =  5.6053544
Iteration  2: sum of abs. weighted deviations =  3.4679815
Iteration  3: sum of abs. weighted deviations =  1.9522992
Iteration  4: sum of abs. weighted deviations =  1.5315353
Iteration  5: sum of abs. weighted deviations =  .68654083
Iteration  6: sum of abs. weighted deviations =  .58770479
Iteration  7: sum of abs. weighted deviations =  .51375749

.99 Quantile regression                          Number of obs =       366
  Raw sum of deviations .5311391 (about .0580638)
  Min sum of deviations .5137575                 Pseudo R2     =    0.0327

  returnASII |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
lagreturnJII |  -.2622221   .4658798    -0.56   0.574    -1.178376    .6539318
       _cons |   .0585237   .0040788    14.35   0.000     .0505027    .0665448
```

Figure 1: ASII Stock QRM Parameter Estimation Output

Based on Figure 1, the value is obtained $\alpha^{ASII} = 0.0585237$ and $\beta^{ASII} = -0.262221$, For other stocks, follow the same method. After getting value α^{i}, β^{i}, α^{JII} and β^{JII} then count $\hat{\alpha}^{i}$, $\hat{\beta}^{i}$, $\hat{\alpha}^{JII}$ and $\hat{\beta}^{JII}$. The following is an example of a calculation $\hat{\alpha}^{i}$, $\hat{\beta}^{i}$ PT shares Astra International, Tbk (ASII) with data:

Table 1: Calculation Example $\hat{\alpha}^{i}$ and $\hat{\beta}^{i}$ ASII shares

No.	Date	Return ASII (X_t^{ASII})	Lag Return (M_{t-1})	$M_{t-1}. X_t^{ASII}$	M_{t-1}^2
1	1/4/2010	-	-	-	-
2	1/5/2010	0.00564973	-	-	-
3	1/6/2010	- 0.00564973	0.01706865	$-9.64x10^{-5}$	0.000291
...	...	...	...	...	...
369	6/3/2010	0.031977145	0.0040749	0.00013	0.0000275
	Amount	0.567944034	0.23586979	0.011229	0.068495
	Average	0.01602027	0.000642979		

$$\hat{\beta}^{ASII} = \frac{n\sum M_{t-1}X_t^{ASII} - (\sum M_{t-1})(\sum X_t^{ASII})}{n\sum M_{t-1}^2 - (\sum M_{t-1})^2} = \frac{369x0.011129-(0.23586979x0.567944034)}{369x0.587994-0.23586979^2} = 0.069077088$$

$$\hat{\alpha}^{JII} = \bar{X}_t^{JII} - \hat{\beta}^{JII}\bar{M}_{t-1} = 0.001602027 - (0.069077088x0.000642697) = 0.000532$$

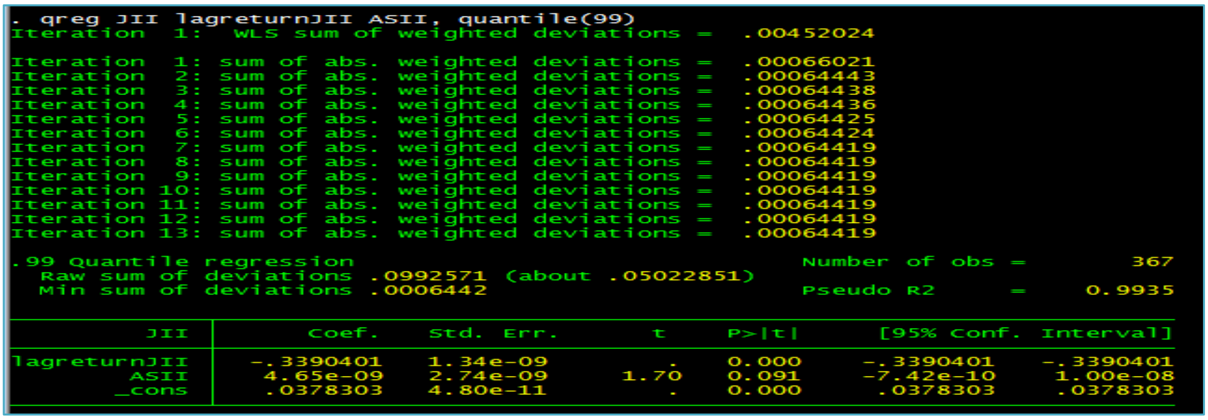
After getting value $\hat{\alpha}^{i}$ and $\hat{\beta}^{i}$, Calculate VaR ASII following equation (14). VaR for ASII stock, as follows:

$$VaR_t^{ASII}(p) = 0.00053 + 0.06908 M_{t-1} = 0.000573$$

Other stock VaR calculations follow the same method.

4.3. Calculation of Conditional Value at Risk (CoVaR)

Before calculating CoVaR, look for it first $\alpha^{JII|i}$, $\beta^{JII|i}$, and $\gamma^{JII|i}$. Here's an example $\alpha^{JII|i}$, $\beta^{JII|i}$, and $\gamma^{JII|i}$ ASII shares using STATA 10 software:



```
. qreg JII lagreturnJII ASII, quantile(99)
Iteration  1:  WLS sum of weighted deviations =  .00452024

Iteration  1: sum of abs. weighted deviations =  .00066021
Iteration  2: sum of abs. weighted deviations =  .00064443
Iteration  3: sum of abs. weighted deviations =  .00064438
Iteration  4: sum of abs. weighted deviations =  .00064436
Iteration  5: sum of abs. weighted deviations =  .00064425
Iteration  6: sum of abs. weighted deviations =  .00064424
Iteration  7: sum of abs. weighted deviations =  .00064419
Iteration  8: sum of abs. weighted deviations =  .00064419
Iteration  9: sum of abs. weighted deviations =  .00064419
Iteration 10: sum of abs. weighted deviations =  .00064419
Iteration 11: sum of abs. weighted deviations =  .00064419
Iteration 12: sum of abs. weighted deviations =  .00064419
Iteration 13: sum of abs. weighted deviations =  .00064419

.99 Quantile regression                         Number of obs =        367
  Raw sum of deviations .0992571 (about .05022851)
  Min sum of deviations .0006442                Pseudo R2     =     0.9935

         JII |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lagreturnJII |   -.3390401   1.34e-09      .    0.000    -.3390401   -.3390401
        ASII |    4.65e-09   2.74e-09   1.70    0.091    -7.42e-10    1.00e-08
       _cons |    .0378303   4.80e-11      .    0.000     .0378303    .0378303
```

Figure 2: ASII Stock Parameter Estimation $\alpha^{JII|i}$, $\beta^{JII|i}$, and $\gamma^{JII|i}$

Based on Figure 2, the value is obtained $\alpha^{JII|ASII} = 0.0378303$, $\beta^{JII|ASII} = -0.339040$, dan $\gamma^{JII|ASII} = 4.65x10^{-9}$. So the estimated value is as follows:

Table 2: Calculation Example $\hat{\alpha}^{JII|i}$, $\hat{\beta}^{JII|i}$, and $\hat{\gamma}^{JII|i}$ASII shares

No.	Date	Return JII (X_t^{JII})	Lag Return JII (M_{t-1})	Return ASII (X_t^{ASII})	$M_{t-1}. X_t^{JII}$	$X_t^{ASII}.X_t^{JII}$	$M_{t-1}. X_t^{ASII}$	M_{t-1}^2	$X_t^{ASII^2}$
1	1/4/2010	-	-	-	-	-	-	-	-
2	1/5/2010	0.0171	-	0.0056	0	$9.6x10^{-5}$	0	0	0
3	1/6/2010	0.0028	0.0171	-0.0056	$4.8x10^{-5}$	$-2x10^{-5}$	$-9.6x10^{-5}$	$-3x10^{-7}$	$-7.6x10^{-5}$
...	...	...	...	...	...	...	...	...	...
369	6/3/2010	0.0166	0.0041	0.0166	$6.8x10^{-5}$	0.0003	$6.8x10^{-3}$	$2x10^{-3}$	0.0003
Amount		0.02359	0.2359	0.5679	-0.0148	0.0184	0.0112	0.068	0.1588

$$\hat{\beta}^{JII|ASII}=\frac{(n\sum M_{t-1}X_t^{JII}-\sum M_{t-1}\sum X_t^{JII})(n\sum {X_t^{ASII}}^2(\sum X_t^{ASII})^2)-(n\sum M_{t-1}X_t^{ASII}\sum M_{t-1}\sum X_t^{ASII})(n\sum X_t^{ASII}X_t^{JII}-\sum X_t^{ASII}\sum X_t^{JII})}{(n\sum {M_{t-1}}^2-(\sum M_{t-1})^2)(n\sum {X_t^{ASII}}^2(\sum X_t^{ASII})^2)-(n\sum M_{t-1}X_t^{ASII}-\sum M_{t-1}\sum X_t^{ASII})^2}=-0.34781$$

$$\hat{\gamma}^{JII|ASII}=\frac{(n\sum X_t^{ASII}X_t^{JII}-\sum X_t^{ASII}\sum X_t^{JII})(n\sum {M_{t-1}}^2\sum {M_{t-1}}^2)-(n\sum M_{t-1}X_t^{JII}-\sum M_{t-1}\sum X_t^{JII})(n\sum M_{t-1}X_t^{ASII}-\sum M_{t-1}\sum X_t^{ASII})}{(n\sum {M_{t-1}}^2-(\sum M_{t-1})^2)(n\sum {X_t^{ASII}}^2(\sum X_t^{ASII})^2)-(n\sum M_{t-1}X_t^{ASII}-\sum M_{t-1}\sum X_t^{ASII})^2}=0.00131$$

$$\hat{\alpha}^{JII|ASII}=\frac{\sum X_t^{JII}-\hat{\beta}^{JII|ASII}\sum M_{t-1}-\hat{\gamma}^{JII|ASII}\sum X_t^{ASII}}{n}=0,037646$$

After getting value $\hat{\alpha}^{JII|ASII}$, $\hat{\beta}^{JII|ASII}$, and $\hat{\gamma}^{JII|ASII}$ then calculate CoVaR following equation (20). CoVaR for ASII shares, namely:

$$CoVaR_t^{ASII}(p)=0.037646-0.34781M_{t-1}+0.00131VaR_t^{ASII}(p)=0.037438929$$

The calculation of CoVaR for other shares follows the same method.

4.4. Calculation of Systemic Risk

The following is an example of calculating systemic Risk ($\Delta CoVaR$) for ASII shares, following equation (25):

$$\Delta CoVaR_t^{ASII}(p)=CoVaR_t^{ASII}(p)-VaR_t^{JII}(p)=0.037438929-0.00650=0.03098929$$

The calculation of the systemic Risk of other stocks follows the same method. The following are VaR, CoVaR, and systemic risk values ($\Delta CoVaR$) of sharia stocks:

Table 3: Value of VaR, CoVaR, and Systemic Risk ($\Delta CoVaR$)

No.	Stocks	VaR	CoVaR	Systemic Risk ($\Delta CoVaR$)
1	ASII	0.000573	0.037438929	0.030938929
2	AALI	0.001347	0.037438481	0.030938481
3	ANTM	0.001322	0.037438248	0.030938248
4	INTP	0.000635	0.037438309	0.030938309
5	PTBA	0.000622	0.037438609	0.030938609
6	SMGR	0.000654	0.03743815	0.030938150
7	TLKM	0.000978	0.037435785	0.030935785
8	UNVR	0.000765	0.03743866	0.030938660

Based on Table 3, the stock with the most significant value is AALI, while the stock with the most considerable systemic risk value is ASII. That is, between the VaR of each Islamic stock and its systemic Risk ($\Delta CoVaR$) Have a weak relationship. Stocks with a high VaR do not necessarily significantly impact the Risk in the system (not necessarily has a systemic effect).

4.5. Model Validation

Following equation (26), the model validation for each stock is obtained as follows:

Table 3: Value of VaR, CoVaR, and Systemic Risk

Stock Code	Confidence Level	T	V	Df	Critical Value	LR Value	Conclusion
ASII	99%	369	28	1	6.63	0.665	Ho Accepted
AALI	99%	369	26	1	6.63	0.583	Ho Accepted
ANTM	99%	369	22	1	6.63	0.429	Ho Accepted
INTP	99%	369	30	1	6.63	0.751	Ho Accepted
PTBA	99%	369	22	1	6.63	0.429	Ho Accepted
SMGR	99%	369	22	1	6.63	0.429	Ho Accepted
TLKM	99%	369	13	1	6.63	0.144	Ho Accepted
UNVR	99%	369	21	1	6.63	0.392	Ho Accepted

Based on Table 5.6, all Islamic stocks show that H_0 is accepted, meaning that the Quantile Regression Models (QRM) are suitable for calculating systemic Risk. Calculating Systemic Risk in the first quantile with a 99% confidence interval is valid.

5. Conclusion

Based on the results of research conducted on stocks JII and LQ45 in the Indonesia Stock Index, it can be concluded that:

1. Value at Risk (*VaR*) of ASII, AALI, ANTM, INTP, PTBA, SMGR, TLKM, and UNVR shares, respectively 0.000573, 0.001347, 0.001322, 0.000635, 0.000622, 0, 000654, 0.000978, and 0.000705. (*Conditional Value at Risk)*
2. CoVaR ASII, AALI, ANTM, INTP, PTBA, SMGR, TLKM, and UNVR shares, respectively 0.037438929, 0.037438481, 0.037438248, 0.037438309, 0.037438609, 0 .037438150, 0.037435785, and 0.037438660.
3. Systemic risk values for ASII, AALI, ANTM, INTP, PTBA, SMGR, TLKM, and UNVR stocks are 0.030938929, 0.030938481, 0.0309389248, 0.030938309, 0.030938309, 0.030938609, 0, 0, respectively 030938150, 0.030935785, and 0.030938660

The sharia stocks with the VaR are ASII, PTBA, INTP, SMGR, UNVR, TLKM, ANTM, and AALI. In contrast, the order of sharia stocks with the smallest to the most significant systemic risk value is TLKM, SMGR, ANTM, INTP, AALI, PTBA, UNVR, and ASII.

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