



Factors Influencing the Performance of Indonesia's Sukuk Index During the Covid-19 Pandemic

Dinda Febriana¹, Resfa Fitri², Mohammad Iqbal Irfany³

^{1,2,3} Faculty of Economics and Management, IPB University, Indonesia

The performance of Sharia-compliant bonds or sukuk can be affected by both internal and external factors, such as coupon rates and macroeconomic variables. This study aims to examine the impact and contribution of variables, namely the volatility index (VIX index), global sukuk index, BI rate, Consumer Price Index, and exchange rates, on the return of the Indonesian sukuk index from January 2018 to February 2020 and from March 2020 to December 2022, before and during the Covid-19 pandemic. As a research method, the Vector Error Correction Model (VECM) is applied. Prior to the Covid-19 pandemic, the long-term return of the Indonesian sukuk index was driven by the VIX index, the BI rate, and exchange rates, whilst the global sukuk index had no influence. During the Covid-19 epidemic, the return of the Indonesian sukuk index was influenced by the VIX Index, the global sukuk index, inflation, and exchange rates, but was unaffected by the BI rate variable. During the Covid-19 epidemic, the return of Indonesian sukuk index was primarily driven by the global sukuk index.

OPEN ACCESS

*Correspondence:

Mohammad Iqbal Irfany
iqbal.irfany@apps.ipb.ac.id

Received: 7 April 2024

Accepted: 29 May 2024

Published: 13 June 2024

Citation:

(2024) Factors Influencing the Performance of Indonesia's Sukuk Index During the Covid-19 Pandemic. Islamic Capital Market. 2.1.

Open access under Creative Commons Attribution-NonCommercial 4.0 International License (CC-BY-NC) ©Author(s)

Keywords: Sukuk Index, Influencing Factors, Indonesia, Volatility



INTRODUCTION

Risk management and effective financial allocation are crucial during times of crisis, which attracts investors from throughout the world to Islamic finance. The entire value of Islamic finance increased steadily from 2014 to 2020, reaching \$3.37 trillion USD in 2020, and is anticipated to reach \$4.94 trillion USD by 2025. (Islamic Finance Development Report 2021). In 2020, sukuk has the second-largest market share among Islamic financial instruments with 19 percent (\$631 billion USD) (IFDR 2020). Despite joining the market in the mid-1990s, sukuk, a Sharia-compliant financial vehicle, grew at an annual pace of 31.23 percent (2020-2021), resulting in a record issuance of 154,552 sukuk worth \$732.10 billion USD in 2021. (International Islamic Finance Market Sukuk Report 2022). This trend illustrates sukuk's significance in the international financial landscape and its enhanced supply-and-demand synchronization (International Islamic Finance Market Sukuk Report 2022).

Sukuk provide better yields and lower volatility amid interest rate increases (Bhuiyan et al., 2018). Holders enjoy unlimited ownership benefits over tangible or intangible underlying assets, with tangible ownership granting asset benefits and intangible ownership involving issuer responsibility in default, providing direct access to underlying assets (Afshar, 2013). Sukuk suffer a variety of risks, including liquidity, market, operational, and credit risks (Nanaeva, 2010). The Covid-19 pandemic caused worldwide financial anxiety in early 2020, hurting global finance (Sharif et al., 2020). Yarovoya et al. (2020) discovered that Covid-19 has a negative influence on conventional and Shariah stock returns, with bond and sukuk returns showing smaller decreases. Figure 1 displays the movement of conventional and Shariah stocks, bonds, and sukuk during this time period. Despite WHO's classification of the epidemic as a worldwide calamity, sukuk outperformed equities due to differing spillover effects between stock and bond markets.

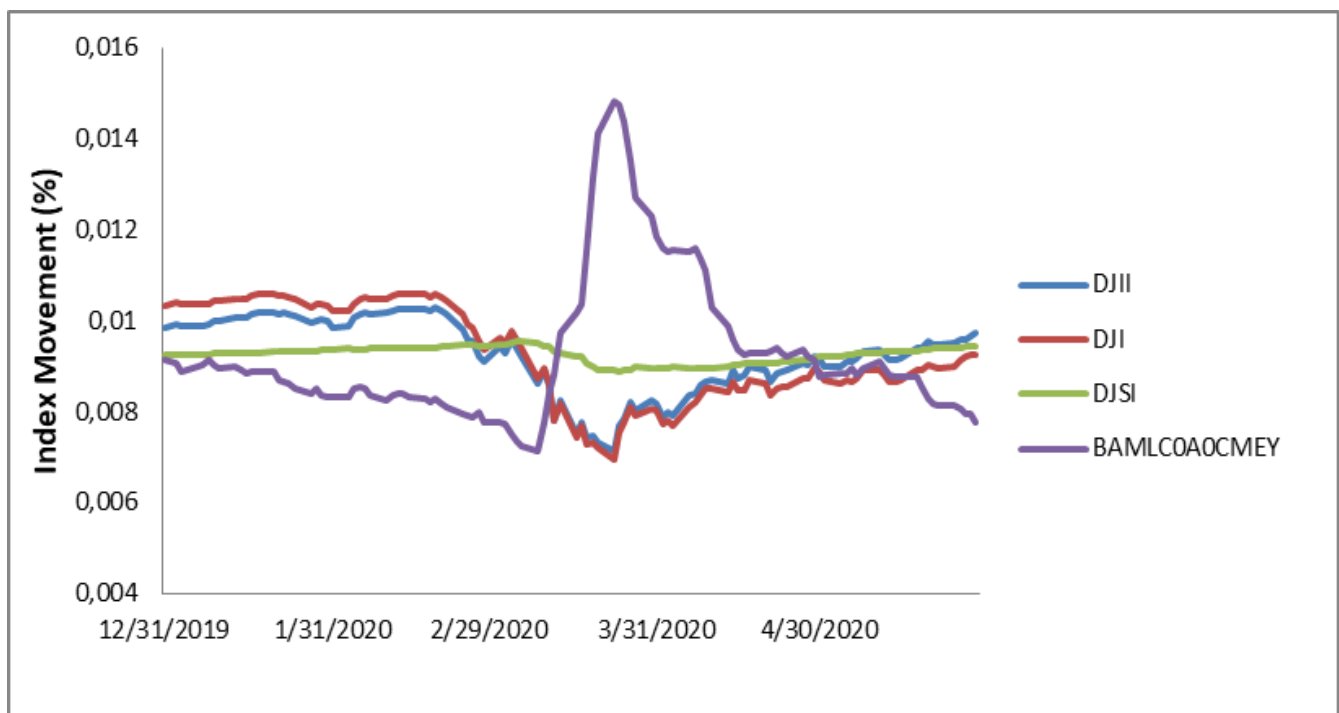


Figure 1: Prior to the WHO declaring the Covid-19 epidemic, the movement of traditional stock indexes, Sharia-compliant stocks, bonds, and global sukuk

The Covid-19 epidemic has also increased volatility in global financial markets. The Economic Policy Uncertainty Index (EPU) and the Volatility Index (VIX) have both weakened, rising from 122.2 and 18.8 to 557 and 53.5, respectively (Indonesia Economic Report 2020). Despite the pandemic, the development of sukuk in Indonesia has remained

strong, but at a lower value than the bond market. As illustrated in Figure 3, the outstanding sukuk value has increased year after year, reaching Rp30.8 trillion in 2018 and Rp42.5 trillion in 2022. Sukuk saw a fall in the Compound Annual Growth Rate (CAGR), with an annual rate decreasing from 30.8 percent to 18.9 percent from 2021 to 2022 (OJK).

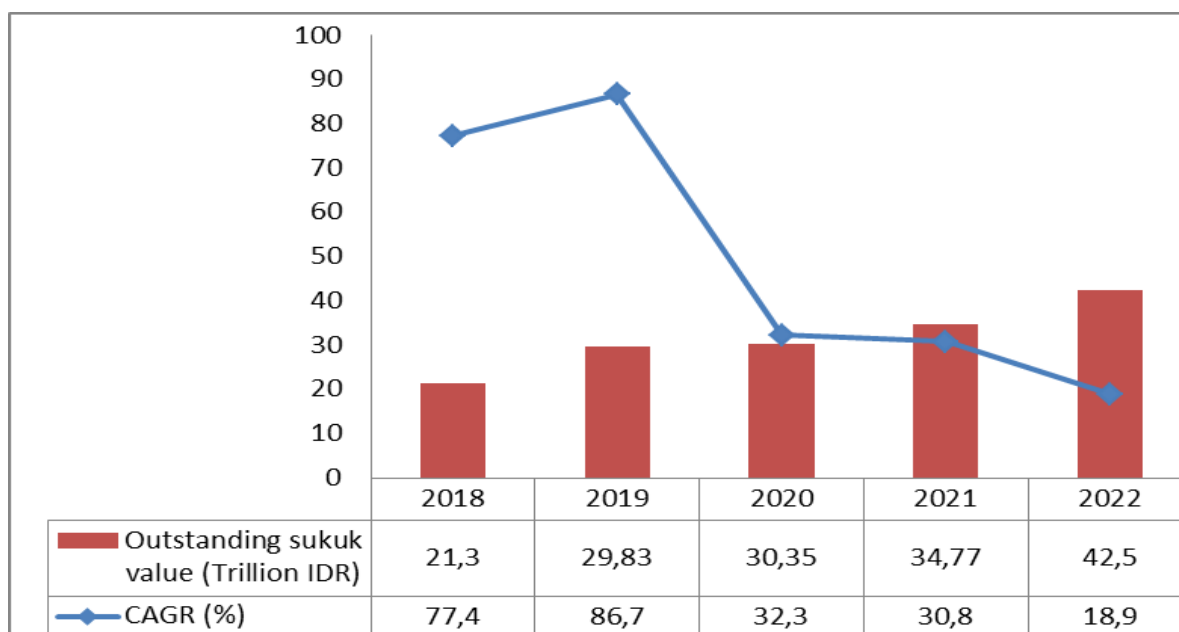


Figure 2: The development of outstanding sukuk value in Indonesia from 2018 to 2022.

Sukuk performance can be influenced by a variety of factors, one of which is the impact of macroeconomic factors on sukuk performance variations in Indonesia. Bapepam (2019) did a study and discovered that external factors have a greater influence on sukuk issuance than internal considerations. Sukuk issuance acts as a funding vehicle that the government can use to solve macroeconomic challenges such as inflation and unemployment, thereby helping to economic growth. The BI-7 days reverse repo rate, consumer price index, and currency rates were the macroeconomic variables studied in this study. As a result, it is intriguing to evaluate the response of the Indonesian sukuk index to the VIX index, global sukuk index, and macroeconomic variables during the Covid-19 pandemic.

LITERATURE REVIEW

Sukuk is an alternative investment for a variety of portfolios, including corporate sukuk and government sukuk (SBSN). SBSN's significance in APBN financing is growing, with yearly issuances increasing since 2008, reaching Rp192.49 trillion in 2018, driven by a US\$1.75 billion green sukuk issuance in 2018. According to KNEKS's 2022 Outlook, state sukuk assets amounted Rp1.125 trillion (18.52 percent market share) in 2021, while corporate sukuk assets totaled Rp34.77 trillion (7.55 percent market share), with 495 issuers seeing 18.1 percent growth. Indonesia's green tranche sukuk issuance of US\$750 million reflects the country's ongoing market development initiatives (Islamic Finance Outlook

2022). Sukuk development in secondary markets may not follow primary market growth, influencing price volatility. According to the Supply and Demand Theory, low sukuk transaction volumes can amplify price volatility, affecting investor returns (Boumediene, 2015). Bond markets thrive amid economic downturns, resulting in lower yields and higher bond prices (Tandelilin, 2001).

According to the Bond Price Theory, the price of sukuk is determined by the future cash flow of coupons and principal, discounted by a predetermined yield rate (r). Blanchard (2011) proposes the following bond price formula:

$$P_t = C \times (1 - (1+r)^{-n})/r + F/(1+r)^n \tag{1}$$

This formula depicts an inverse relationship between interest rates and bond prices; as rates rise, bond prices fall, and vice versa. Bond prices are also influenced by the time to maturity factor. This assumption is consistent with Bhojraj and Sengupta's (2003) Interest Rate Risk Theory, which states that longer maturities result in larger percentage changes in bond values due to interest rate swings.

The sukuk index serves as a sukuk performance and yield measure, reflecting market trends in a variety of scenarios. The Indonesia Bond Pricing Agency (IBPA) publishes the Indonesia Sukuk Index, which is in charge of the daily appraisal and pricing of debt instruments in Indonesia. Financial sector participants use the data obtained from its fixed-income pricing computations to guide debt transactions, government bond issues, asset appraisal, audit references, and

portfolio analysis.

IBPA's Indonesia Sukuk Index Composite (ISIXC) measures the performance of both government and business sukuk. This sukuk index serves as a benchmark for assessing the performance of the sukuk market, providing investors and portfolio managers with a point of reference. There are five basic classifications used in the construction of both sukuk and bond indices:

1. Total Return (TR): Explains the overall sukuk return rate, calculated by aggregating gains from changes in sukuk prices, considering both increases and decreases, and incorporating profits from margin and annual reinvested coupons.
2. Clean Price (CP): Describes the comprehensive

movement in sukuk prices, calculated by adjusting prices to exclude the accumulation of gains or profit-sharing.

3. Gross Price (GP): Illustrates the complete shift in sukuk prices, computing the value of price fluctuations along with accumulated gains.
4. Effective Yield (EY): Encompasses the entire movement of sukuk yields, calculated through changes in yield rates that incorporate the accumulation of annual gains.
5. Gross Yield until Redemption (GY): Explains the comprehensive shift in sukuk yield rates, taking into account fluctuations in sukuk yield, ongoing annual profit accumulation, and the duration of the sukuk.



Figure 3: The primary ISIXC classification movements before and during the Covid-19 pandemic: (3a) total return; (3b) clean price; (3c) gross price; (3d) effective yield; (3e) gross yield.

The S&P Worldwide Dow Jones Sukuk Index (ex-Reinvestment) (DJSUKTXR) is an important performance indicator for the global sukuk market.

This index measures investments in US dollars that do not include reinvestment. In 2017, the market for USD-denominated sukuk expanded rapidly. The Dow

Jones Sukuk Index (ex-Reinvestment) has added 13 new sukuk with a total nominal value of US\$20.75 billion over the last five years. According to this index, sovereign sukuk contributed 75%, with Saudi Arabia accounting for \$9 billion, Indonesia accounting for \$3 billion, Oman accounting for \$2 billion, and Hong Kong accounting for \$1 billion. IDB Trust's US\$2.5 billion offering stood out among the greatest

corporate sukuk issuances, with contributions from Saudi Arabia (58 percent), Indonesia (14 percent), and Oman (12 percent). However, with the revelation of the global pandemic due to Covid-19 in March 2020, the global sukuk index witnessed a significant correction. Figure 5 shows that the global sukuk index corrected by 48% in March 2020.

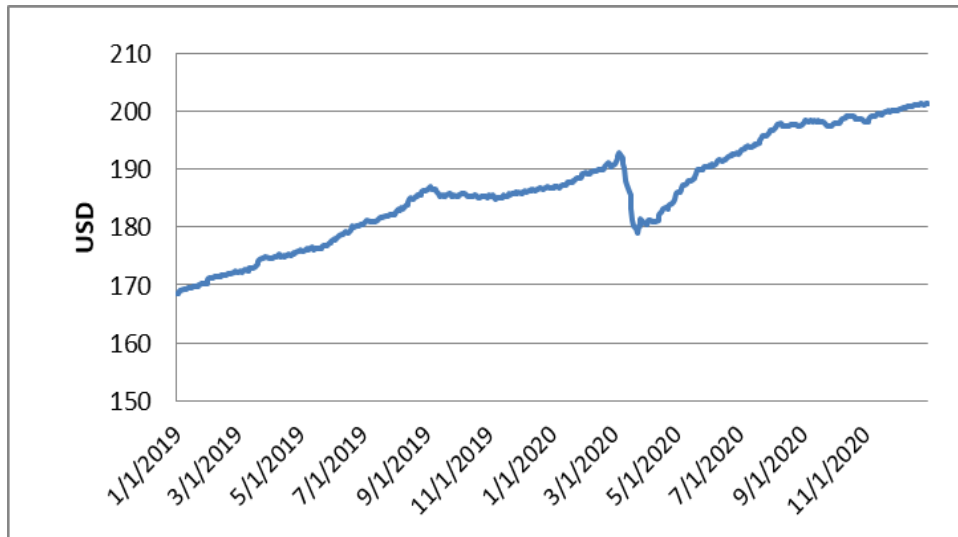


Figure 4: The movement of the global sukuk index before and during the Covid-19 pandemic.

On March 9, 2020, the World Health Organization proclaimed the Covid-19 pandemic. On March 2, 2020, President Joko Widodo formally announced the first Covid-19 case in Indonesia (Ihsanuddin 2020). The global economy saw enormous disruptions as the pandemic unfolded. The International Monetary Fund and World Bank forecast a global economic crisis of unprecedented proportions by the end of the first quarter of 2020. Global economic growth fell by -2.8 percent,

representing a significant 6 percent correction from the previous period's economic growth. Previously, a 3% increase in global economic growth was predicted for 2020 by the conclusion of the first quarter (Carrillo and Castillo 2020). The expansion of the pandemic also had an influence on Indonesia's economic growth, which was visible in the first quarter of 2020, when household spending was only 2.48 percent, down from 4.97 percent in the fourth quarter of 2019. (Bank Indonesia 2020).

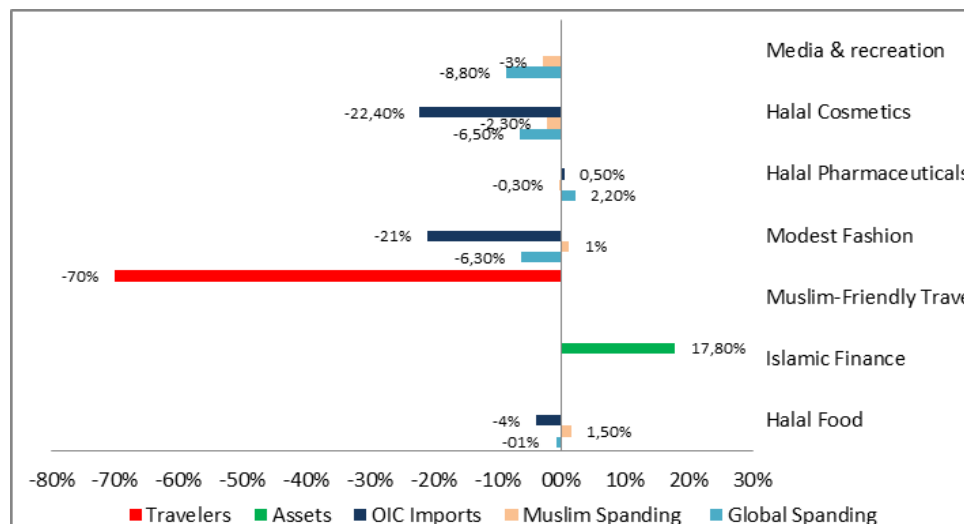


Figure 5: The Impact of Covid-19 on the Global Islamic Economy.

The Covid-19 pandemic had an impact on the Islamic economy, with several sectors suffering both positive and negative growth patterns. The Islamic financial industry made strides in its recovery from the pandemic. According to Figure 6, Islamic financial assets increased by 17.8 percent in 2020 over the previous year. Although Islamic bank earnings initially dipped in early 2020, it recovered. This rebound has been fueled by subsidies for businesses and the retail sector. Several countries used sukuk to promote post-Covid-19 funding in the framework of Islamic finance recovery. Indonesia is an example of a country that uses this strategy, having become the largest sovereign sukuk issuer in 2020. In addition to sovereign sukuk, social financial mechanisms like as zakat, wakaf, and social sukuk helped to alleviate the economic burden of the Covid-19 pandemic (State of the Global Islamic Economy Report 2022).

The VIX index was created by the Chicago Board of Options Exchange (CBOE) and was later incorporated into the S&P 500 Index. The VIX index has been representing volatility calculated from S&P 500 options since 2003, indicating predicted volatility over a 30-day period. It considers market pricing for SPX options, SPXW options, and US Treasury options. The VIX index, which serves as a real-time gauge of

short-term market risk, is often known as the "fear index." The VIX index's daily movements reflect changing expectations of market swings, and it plays an important role in risk management in the capital market. The VIX index, which includes non-equity options, uses option prices to reflect market volatility predictions. Its calculation incorporates numerous choice component selection rules that are applied in accordance with a generally used formula:

$$\sigma^2 = \frac{2}{T} \sum_i \frac{\Delta K_i}{K_i^2} e^{RT} Q(K_i) - \frac{1}{T} \left[\frac{F}{K_0} - 1 \right]^2 \tag{2}$$

- σ : VIX index = $\sigma \times 100$
- T : Time to expiration (in years)
- F : Option-implied forward price
- K_0 : First strike equal to or otherwise immediately below the forward index level, F
- K_i : Strike price of the *i*th out-of-the-money option; a call if $K_i > K_0$ and a put if $K_i < K_0$ both put and call if $K_i = K_0$.

$$\Delta K_i : \Delta K_i = \frac{K_{i+1} - K_{i-1}}{2}$$

R : Risk-free interest rate to expiration

$Q(K_i)$: The midpoint of the bid-ask spread for each option with strike K_i

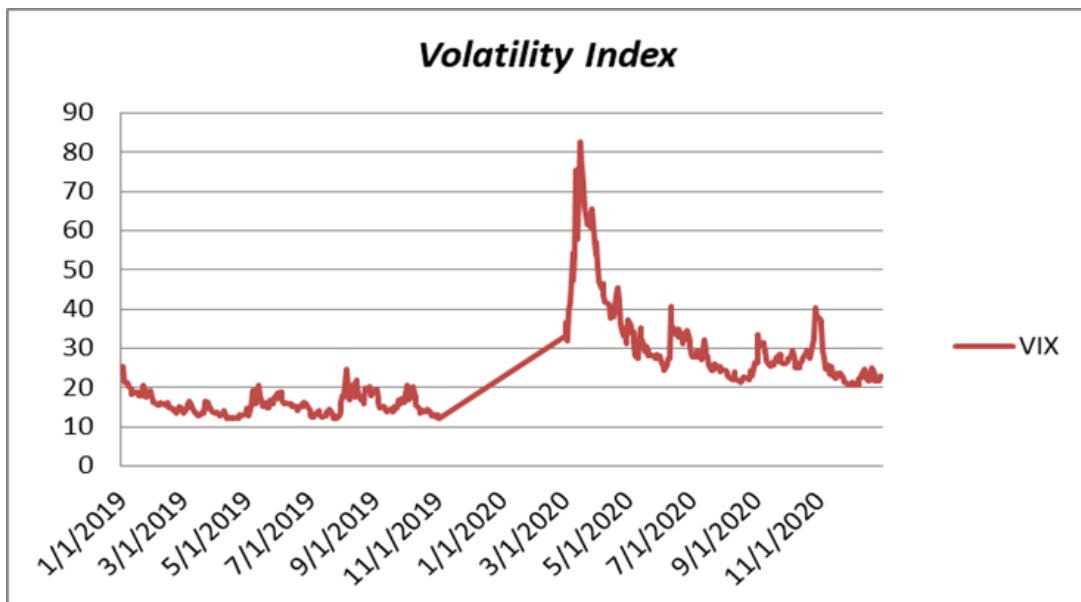


Figure 6: The movement of the VIX index before and during the occurrence of the Covid-19 pandemic.

As seen in Figure 7, the VIX index, which indicates secondary market risk, had a huge increase during the global pandemic announcement of Covid-19 in March 2020. Prasad et al. (2022) discovered a high association between economic policy uncertainty

indices, gold prices, the USD index, and crude oil and the VIX index in their study of the impact of US macroeconomic variables on the CBOE VIX Index. Similarly, there are significant correlations between the financial stress index, Fed interest rates, and credit

spread. The VIX index also works as an external factor influencing Indonesia's worldwide sovereign bond yields, serving as an important reference for investors to measure relevant global market mood, which has a substantial impact on the compensation investors receive for owning Indonesian debt instruments (Jacobs et al., 2011).

Impact of Macroeconomic Variables on Sukuk Index

Although the theoretical association between economic variables and sukuk performance has not been demonstrated clearly, it is thought that macroeconomic variables can influence sukuk performance. As indicated in Table 1, Indonesia's macroeconomic indices, such as the BI rate, CPI, and exchange rates, have fluctuated from 2018 to 2022.

Table 1. Indonesian Macroeconomic Indicators for 2018 to 2022

Macroeconomic Indicator	2018	2019	2020	2021	2022
BI rate	5,06%	5,63%	4,25%	3,32%	3,86%
Consumer Price Index	146,73	151,18	154,08	156,48	163,07
Exchange Rate	14.481	13.901	14.105	14.269	15.231

Source: Bank Indonesia and International Financial Statistics

Investors must examine the general economic situation while making investing decisions (Bodie 2006). According to this idea, macroeconomic factors will have an impact on sukuk performance. This is corroborated by Suciningtias (2018) research findings, which show that the long-term return of sukuk indices in Indonesia is influenced by inflation, exchange rates, and world gold prices. In the short term (one to two months), the BI rate, currency rates, and world gold prices have an impact on the sukuk index. Ardiansyah and Lubis (2017) found that money supply, industrial production index, and inflation all had a favorable impact on corporate sukuk growth in Indonesia. Furthermore, the evolution of corporate sukuk in connection to exchange rates, oil prices, and the yield on mudharabah deposits is negative.

The BI-7 Day Reverse Repo Rate, according to Bank Indonesia, is an interest rate that has a rapid impact on the money market, banking industry, and real sector. The BI-7 Day Reverse Repo Rate is made up of products that are closely related to interest rates in the transactional or traded money market. The announcement of the BI-7 Day Reverse Repo Rate to be used in monetary operations via liquidity in the money market is critical to meeting the goal of monetary policy implementation (Wibisono 2010). Stock and bond prices suffer because of financial contraction. Bond prices have fallen, making them more desirable to investors due to higher returns upon maturity. Bond yields, according to Prastowo (2007), have an inverse relationship with bond prices but a direct relationship with interest rates. According to Tandelilin (2010), who conducted this study, interest rates are utilized as one of the variables to predict bond

and stock values, although interest rates have an adverse association with both stock and bond prices. Stock and bond prices will fall if interest rates rise.

The Consumer Price Index (CPI) is an inflation indicator that explains variations in price fluctuations within a region. Changes in this index reveal changes in the prices of products and services purchased by the general public. According to the Fisher Effect theory, there is a direct relationship between inflation and interest rates. Nominal interest rates are impacted when the inflation rate changes. According to this idea, the nominal interest rate is calculated by adding the real interest rate and the inflation rate. As a result, changes in the nominal interest rate cause commensurate changes in the real interest rate.

Exchange rates, often known as currency values, are important macroeconomic variables used to gauge a country's economic strength. The exchange rate of a country is determined by the government's foreign exchange policy. The Organization of Islamic Cooperation (OIC) Fiqh Council advises Muslim states to oversee the money market and regulate foreign exchange transactions in accordance with Sharia principles, avoiding severe economic shocks (Ayub 2009). The movement of foreign exchange rates has a direct impact on bond pricing and trading. Indonesia has a floating exchange rate method, which determines the exchange rate based on market equilibrium and strength. Exchange rate fluctuations and volatility might have an impact on the bond market. According to Rahardjo's (2014) research, exchange rates have a positive influence on government bond yields at one, five, and ten-year intervals. According to the findings of Wahida's (2011) study, sukuk issuance prioritizes

current economic criteria such as GDP, foreign reserves, and international liquidity

RESEARCH METHODOLOGY

Time series data is the sort of data used in this study. The Indonesia Sukuk Index Composite - Total Return (ISIXC-TR) data was used in this study, with clean prices. Other variables used in this study include the Volatility Index, Dow Jones Sukuk Index (ex-Reinvestment), BI-7 Days Reverse Repo Rate, Consumer Price Index or inflation, and the Indonesian Rupiah exchange rate. This study makes use of daily data.

Secondary data in the form of time series is used in this investigation. The study period is divided into two parts: before the Covid-19 pandemic and during the Covid-19 pandemic. The pre-Covid-19 pandemic period begins on January 1, 2018, and ends on February 28, 2020, while the Covid-19 pandemic period begins on March 2, 2020, and ends on December 30, 2022. The data sources used are www.phei.co.id, S&P Dow Jones Indices, Cboe Global Indices, International Financial Statistics, and Bank Indonesia.

Co-integrated variables are referred to be long-term equilibrium conditions in the field of econometrics (Nachrowi D Nachrowi, 2006). It should be observed that the presence of a long-term link between variables does not always imply the presence of a short-term equilibrium. When the data indicates stationarity at the level process, the conventional VAR (unrestricted VAR) model, also known as Vector Autoregression, can be derived. In contrast, when the data exhibits stationarity in the differentiation process and co-integration among variables, VECM testing becomes necessary. The VECM model, a constrained VAR model, is used to account for cointegration or long-term interactions between variables in VAR estimation. The following are the stages of the research approach in order: (i) Stationary ADF test; (ii) Johansen Co-integration test; (iii) Estimation of Vector Correction Mechanism (VECM).

The Vector Error Correction Model (VECM) is considered a representation of the vector autoregressive model that is constrained due to the presence of cointegrated data but non-stationary. VECM is often recognized as a form of VAR that exhibits cointegration relationships but with non-stationary series. In detail, VECM constrains the long-

term relationships of its endogenous variables to converge towards a cointegrated relationship, while allowing for short-term dynamics to persist (Basuki and Prawoto, 2017). VECM incorporates the speed of adjustment from the short term to the long term. The equations of the general VECM model are typically as follows:

$$\Delta y_t = \mu_{0_x} + \mu_{1_x} t + \Pi_x y_{t-1} + \sum_{i=1}^{k-1} \Gamma_{ix} \Delta y_{t-1} + \varepsilon_t \quad (3)$$

Explanation:

y_t : a vector containing the variables analyzed in the study

μ_{0_x} : intercept vector

μ_{1_x} : regression coefficient vector

t : time trend

Π_x : $\alpha\beta'$ becomes b' signifying the long-term cointegration equation

y_{t-1} : in-level variable

Γ_k : regression coefficient matrix

$k-1$: VECM order of VAR

ε_t : error term

Finally, Fixed Effects Vector Decomposition (FEVD) analysis is employed to examine the extent of contributions from other variables to a specific variable by observing the changes occurring in the error variance. The information provided by FEVD offers a robust depiction of whether a variable can influence another variable in the long term. The FEVD analysis also aims to identify factors that exert an influence on the volatility of a variable (Firdaus, 2020).

RESULTS AND DISCUSSION

The data stationarity test in this study employs the Augmented Dickey-Fuller (ADF) method. Based on Table 2 above, the results of the stationarity test in this study indicate that the Exchange Rate (LNKurs) becomes stationary at the level with a significant level of 10 percent during the Covid-19 pandemic period. In both the pre-Covid-19 and Covid-19 pandemic periods, the Volatility Index variable (LNVIX) is stationary at the level. All data in this research variable become stationary at the first difference level in both periods, thus confirming that the research data has been integrated and does not contain a unit root at the first difference level.

Table 2. ADF Stasionarity Test

<i>Augmented Dickey and Fuller (ADF) test</i>			
Before Covid-19 period			
	<i>Level</i>		<i>First Difference</i>
Variabel	Prob.	Variabel	Prob.
LNISIXC	0,6787	D(LNISIXC)	0,0000***
LNVIK	0,0029***	D(LNVIK)	0,0000***
LNDJSUKTXR	1,0000	D(LNDJSUKTXR)	0,0000***
R_BI	0,5973	D(R_BI)	0,0001***
LNIHK	0,8900	D(LNIHK)	0,0001***
LNKURS	0,2405	D(LNKURS)	0,0000***
During Covid-19 period			
	<i>Level</i>		<i>First Difference</i>
Variabel	Prob.	Variabel	Prob.
LNISIXC	0,5809	D(LNISIXC)	0,0000***
LNVIK	0,0017***	D(LNVIK)	0,0000***
LNDJSUKTXR	0,6461	D(LNDJSUKTXR)	0,0000***
R_BI	0,9122	D(R_BI)	0,0045***
LNIHK	1,0000	D(LNIHK)	0,0000***
LNKURS	0,0331*	D(LNKURS)	0,0000***

Source: Own estimation

In this study, cointegration tests were conducted to examine the existence of long-term relationships among each variable. Long-term

relationships can be inferred when cointegration relationships are identified among the variables in the model (Basuki and Prawoto, 2017).

Table 3. Co-integration test results

Before Covid-19 period						
<i>Hypothesized</i>	<i>Trace stat</i>	<i>Critical value 5%</i>	<i>Prob**</i>	<i>Max-Eigen Stat.</i>	<i>Critical value 5%</i>	<i>Prob**</i>
<i>None*</i>	1328,54**	95,7537	0,0000	280,563**	40,07757	0,0000
<i>At most 1*</i>	1047,977	69,8189	0,0000	249,3408	33,87687	0,0000
<i>At most 2*</i>	798,1362	47,8561	0,0000	241,9312	27,58434	0,0000
<i>At most 3*</i>	556,2050	29,7971	0,0000	222,3929	21,13162	0,0000
<i>At most 4*</i>	333,8121	15,4947	0,0000	192,3573	14,26460	0,0000
<i>At most 5*</i>	141,4548	3,84147	0,0000	141,4548	3,841465	0,0000
During Covid-19 period						
<i>Hypothesized</i>	<i>Trace stat</i>	<i>Critical value 5%</i>	<i>Prob**</i>	<i>Max-Eigen Stat.</i>	<i>Critical value 5%</i>	<i>Prob**</i>
<i>None*</i>	1013,34**	95,7537	0,0000	246,092**	40,07757	0,0000
<i>At most 1*</i>	767,244	69,8189	0,0000	188,605	33,87687	0,0000
<i>At most 2*</i>	578,640	47,8561	0,0000	177,908	27,58434	0,0000
<i>At most 3*</i>	400,732	29,7971	0,0000	168,603	21,13162	0,0000
<i>At most 4*</i>	232,129	15,4947	0,0000	158,159	14,26460	0,0000
<i>At most 5*</i>	73,9699	3,84147	0,0000	73,9699	3,841465	0,0000

Source: Own estimation

Table 3 presents the results of cointegration tests for the pre-Covid-19 pandemic period and the Covid-19 pandemic. During the pre-Covid-19 pandemic period, the trace statistic value of 0 (none) is

1328.540, which is greater than the critical value at 5%. The Eigen value of 0 (none) is 280.5634, also exceeding the critical value at 5%. Similarly, during the Covid-19 pandemic period, the trace statistic value of 0 (none) is

1013.336, surpassing the critical value at 5%, and the Eigen value of 0 (none) is 246.0921, which is higher than the critical value at 5%. Therefore, it can be concluded that all variables in both periods have long-term relationships among them. The research model can be further extended using Vector Error Correction Model (VECM) estimation.

During the pre-Covid-19 period, all variables in this study were cointegrated, indicating the presence of both long-term and short-term relationships. The model employed for this research is the Vector Error Correction Model (VECM), which measures the

equilibrium relationships between variables in both the short and long terms, as well as gauges the speed at which these variables converge towards their long-term equilibrium. The results of the VECM model estimation can be determined by comparing the t-statistic values with the t-Table. If the t-statistic result exceeds the t-Table value, it is concluded that variable X influences variable Y. The estimation results for the long-term model during the pre-Covid-19 period are presented in Table 4, while the short-term model estimation for the same period can be found in Table 5.

Table 4. The results of the long-term estimation model in the period before the Covid-19 pandemic.

Variable	Coefficient	T-statistic	Result
D(LNISIXC(-1))	1,000000		
D(LNVIX(-1))	0,109382	[16,8214]***	Significant 1%
D(LNDJSUKTXR(-1))	0,854276	[1,63560]	Insignificant
D(R_BI(-1))	10,23554	[7,53479]***	Significant 1%
D(LNIHK(-1))	3,330382	[4,00410]***	Significant 1%
D(LNKURS(-1))	-0,569790	[-4,49650]***	Significant 1%

Source: Own estimation

In the long-term estimation results for the period prior to the Covid-19 pandemic, as shown in Table 4, the VIX Index, BI rate, and Consumer Price Index (IHK) variables exhibit a positive influence of 1% on the coefficient values. The coefficient for the VIX Index is 0.109, the BI rate coefficient is 0.854, and the IHK coefficient is 3.330. A coefficient of 0.109 for the VIX Index in the first lag indicates that a 1% increase in the VIX Index will lead to a 0.11% increase in sukuk return in the long term. A coefficient of 0.854

for the BI rate in the first lag signifies that a 1% increase in the BI rate will result in a long-term increase of 0.85% in sukuk return. The IHK coefficient of 3.330 in the first lag indicates that a 1% increase in IHK will result in a 3.33% increase in sukuk return in the long term. Given the significant negative influence of 1% on the exchange rate value towards changes in the sukuk index return, a 1% increase in the exchange rate will lead to a decrease of 0.57% in the sukuk index return in the long-term period.

Table 5. The results of the short-term estimation model in the period before the Covid-19 pandemic.

Variable	Coefficient	T-statistic	Result
CointEq1	-0,042384	[-4,03216]***	Significant 1%
D(LNISIXC(-1))	-0,362847	[-9,52902]***	Significant 1%
D(LNVIX(-1))	-0,000807	[-0,93296]	Insignificant
D(LNDJSUKTXR(-1))	0,076921	[1,50932]	Insignificant
D(R_BI(-1))	0,307850	[2,15784]**	Significant 5%
D(LNIHK(-1))	0,244535	[2,92492]**	Significant 5%
D(LNKURS(-1))	-0,004875	[-0,37929]	Insignificant

Source: Own estimation

Based on the estimation results of the short-term period before the Covid-19 pandemic presented in Table 9, several insights can be derived. The change in the return of the Indonesian sukuk index at lag 1 exhibits a significant negative impact of 1%. A 1% increase in the change of the sukuk index return from

the previous day leads to a decline of 0.3% in the sukuk index return on the following day. Both the BI rate and Consumer Price Index (IHK) exhibit a significant positive influence of 5% on the change in the sukuk index return at lag 1. A rise in the BI rate from the previous day contributes to a 0.31% increase in the

Indonesian sukuk index return on the subsequent day, while an increase in IHK from the previous day leads to a 0.24% increase in the sukuk index return on the following day.

However, variables such as the VIX index, global sukuk index, and exchange rate do not exhibit a significant impact on the change in the Indonesian sukuk index return during the short-term period under consideration. This suggests that the VIX index and exchange rate exert different effects: in the long term, both variables have significant influence, but in the short term, they lack statistical significance. On the other hand, the global sukuk index consistently yields results devoid of significant impact in both short and long terms.

Furthermore, the presence of cointegration or long-term relationships is observed for the Indonesian sukuk index. This is evident through the error correction term (CointEq), which denotes the speed at which equilibrium is achieved in the long run. The CointEq value for the Indonesian sukuk index model is -0.042384, signifying a significant 1% level of significance. This value suggests that a disequilibrium from the previous period is corrected by 0.042384% in the subsequent period.

The research findings conclude that in the period before the Covid-19 pandemic, the Indonesia sukuk index exhibits integration or long-term relationships with macroeconomic variables and the

volatility index. This observation aligns with the study by [Suciningtias \(2018\)](#), which demonstrates the cointegration of the Indonesia sukuk index with macroeconomic variables prior to the Covid-19 pandemic. The bond market is influenced by foreign exchange rate movements; unstable exchange rate fluctuations impact the bond market. Additionally, the BI 7 Days Reverse Repo Rate (BI7DRRR) can be utilized to forecast bond or stock prices. During the pre-pandemic period, the Indonesia sukuk index is cointegrated or has a long-term relationship with macroeconomic variables and the VIX index, indicating no long-term influence from the global sukuk index. In this context, portfolio diversification could be advantageous for global sukuk investors during periods of global uncertainty.

The Result of VECM Estimation During the Covid-19 Pandemic

Similar to the pre-Covid-19 period, during the Covid-19 pandemic period, all research variables exhibit cointegration, implying the presence of both long-term and short-term relationships. The comprehensive estimation results for the long-term model during the Covid-19 pandemic period are presented in Table 6, while the short-term model for the Covid-19 pandemic period is presented in the Table 7.

Table 6. The results of the long-term estimation model during the Covid-19 pandemic period

Variable	Coefficient	t-statistic	Result
D(LNISIXC(-1))	1,000000		
D(LNVIX(-1))	0,335617	[16,2513]***	Significant at 1%
D(LNDJSUKTXR(-1))	1,723152	[2,90129]***	Significant 1%
D(R_BI(-1))	5,254009	[1,40953]	Insignificant
D(LNIHK(-1))	-4,995797	[-2,96944]***	Significant 1%
D(LNKURS(-1))	-1,290504	[-3,90136]***	Significant 1%

Source: own estimation

The long-term estimation results for the period before the Covid-19 pandemic, as shown in Table 6, indicate that the VIX index and the global sukuk index variables exhibit a positive influence of 1% on the coefficient value. The coefficient for the VIX index, at 0.336 in the first lag, indicates that a 1% increase in the VIX index would result in a 0.336% increase in sukuk return in the long term. Similarly, the coefficient for the global sukuk index, at 1.723 in the first lag, suggests that a 1% increase in the global

sukuk index would lead to a 1.723% rise in sukuk return in the long term.

Conversely, both the exchange rate (kurs) and the Consumer Price Index (IHK) exhibit significant negative effects of 1% on changes in the sukuk return index. A 1% increase in the exchange rate would lead to a decrease of 1.29% in sukuk return in the long term, while a 1% increase in the IHK inflation would result in a reduction of 4.996% in sukuk return in the long term.

Table 7. The results of the short-term estimation model during the Covid-19 pandemic period

Variable	Coefficient	t-statistic	Result
CointEq1	-0,013135	[-2,55440]**	Significant 5%
D(LNISIXC(-1))	-0,542445	[-15,2969]***	Significant 1%
D(LNISIXC(-2))	-0,391687	[-10,3887]***	Significant 1%
D(LNISIXC(-3))	-0,318582	[-9,46791]***	Significant 1%
D(LNVIX(-1))	0,000722	[0,48442]	Insignificant
D(LNVIX(-2))	0,000937	[0,79231]	Insignificant
D(LNVIX(-3))	-0,000535	[-0,67587]	Insignificant
D(LNDJSUKTXR(-1))	0,203386	[5,32574]***	Significant 1%
D(LNDJSUKTXR(-2))	0,087079	[1,95878]*	Significant 10%
D(LNDJSUKTXR(-3))	0,132087	[3,44198]***	Significant 1%
D(R_BI(-1))	0,088446	[0,62431]	Insignificant
D(R_BI(-2))	-0,179000	[-1,10305]	Insignificant
D(R_BI(-3))	-0,002040	[-0,01455]	Insignificant
D(LNIHK(-1))	0,002001	[0,03138]	Insignificant
D(LNIHK(-2))	0,014807	[0,20508]	Insignificant
D(LNIHK(-3))	0,004191	[0,06771]	Insignificant
D(LNKURS(-1))	-0,009048	[-0,66954]	Insignificant
D(LNKURS(-2))	-0,022189	[-1,50077]	Insignificant
D(LNKURS(-3))	0,006351	[0,50434]	Insignificant

Source: Own estimation

The estimation results of the short-term model during the Covid-19 pandemic period can be observed in Table 7. Changes in the sukuk index returns are present at lag 1, lag 2, and lag 3, exhibiting a significant negative impact of 1%. In the first lag, a 1% increase in the change of sukuk index returns on the previous day leads to a 0.3% decrease in sukuk index returns on the following day. In the second lag, a 1% increase in the change of sukuk index returns on day t-2 results in a 0.39% decrease in sukuk index returns on day t. For the third lag, a 1% increase in the change of sukuk index returns on day t-3 causes a 0.32% decrease in sukuk index returns on day t.

Regarding the global sukuk index indicator (lnDJSUKTXR), it has a significant positive impact of 1% on the change of sukuk index returns at lag 1 and lag 3, while at lag 2, it shows a significant positive influence of 5% on the change of sukuk index returns. In the first lag, a 1% increase in global sukuk returns on the previous day leads to a 0.20% increase in sukuk index returns on the following day. In the second lag, a 10% increase in global sukuk returns on day t-2 results in a 0.20% increase in sukuk index returns on day t. In the third lag, a 1% increase in global sukuk returns on day t-3 causes a 0.13% increase in sukuk index returns on day t.

During the Covid-19 pandemic period, the VIX index, BI rate, exchange rate, and Consumer Price

Index (IHK) variables do not exhibit significant influence on the short-term return of Indonesian sukuk index at lag 1, lag 2, and lag 3. These variables demonstrate different outcomes in the long term, showing an impact on the return of the Indonesian sukuk index.

The research findings conclude that during the Covid-19 pandemic period, the Indonesian sukuk index is integrated or has a long-term relationship with the fear index, global sukuk index, and several macroeconomic variables. This finding aligns with the study by Naifar et al. (2022), which proves the existence of cointegration during the Covid-19 pandemic between the global sukuk index and the Malaysian sukuk index in response to global difficulties and uncertainties represented by the VIX Index. This phenomenon is also observed in the Indonesian sukuk index, which holds the third position in the global sukuk market after Malaysia and Saudi Arabia. Research by Rizal and Humaidi (2019), Alam et al. (2013) demonstrates that retail sukuk issuance is influenced by various factors such as investment product prices, macroeconomics, investment returns, and more. Stable and positive macroeconomic conditions can influence a country's sukuk issuance. During this period, the benefits of diversification in the global sukuk market are diminished due to significant disruptions caused by the Covid-19 pandemic.

Results of Forecast Error Variance Decomposition Test

In the FEVD test results for the Indonesian sukuk index variable (lnISIXC) during the pre-Covid-19 pandemic period, in the first period, the volatility of the Indonesian sukuk index return (lnISIXC) is not influenced by other variables and is solely affected by itself. In the second period, the Indonesian sukuk index return (lnISIXC) starts experiencing shocks from other variables. During the second period, the influence of the Indonesian sukuk index return (lnISIXC) on itself diminishes and retains an impact of 92.08%. Towards

the end of the observation period, the influence of the Indonesian sukuk index return (lnISIXC) on itself is 85.90%.

At the end of the observation period, the other variables that have the most significant influence on the return of the Indonesian sukuk index (lnISIXC) are as follows: VIX Index (lnVIX) at 12.69%, global sukuk index (lnDJSUKTXR) at 0.53%, exchange rate (lnKURS) at 0.52%, Consumer Price Index (lnIHK) at 0.35%, and BI rate (lnR_BI) at 0.01%. The complete results of the IRF test during the pre-Covid-19 pandemic period can be seen in Table 8.

Table 8. The results of the FEVD test during the period before the Covid-19 pandemic.

Period	D(LNISIXC)	D(LNVIX)	D(LNDJSUKTXR)	D(LNR_BI)	D(LNIHK)	D(LNKURS)
1	100,0000	0,000000	0,000000	0,000000	0,000000	0,000000
2	92,08092	6,216076	0,321345	0,113653	0,400372	0,867635
3	90,82983	7,147465	0,510642	0,167041	0,489367	0,855657
4	89,50657	8,146515	0,664526	0,206615	0,681743	0,794032
5	88,91221	8,533413	0,644363	0,192397	0,947068	0,770554
50	86,43662	11,95199	0,556368	0,043645	0,446910	0,564467
100	86,15584	12,33844	0,544227	0,023980	0,396067	0,541452
200	86,00505	12,54596	0,537707	0,013419	0,368764	0,529092
300	85,95312	12,61743	0,535462	0,009782	0,359361	0,524836
400	85,92684	12,65362	0,534325	0,007941	0,354600	0,522681
500	85,91096	12,67547	0,533639	0,006829	0,351725	0,521379
565	85,90362	12,68556	0,533322	0,006316	0,350397	0,520778

Source: Own estimation

Based on the FEVD results of the lnISIXC model during the Covid-19 pandemic period, in the first period, the variability of the return of the Indonesian sukuk index (lnISIXC) is not influenced by other variables and is solely affected by its own variable. In the second period, the variability of the return of the Indonesian sukuk index (lnISIXC) begins to experience shocks from other variables. During the second period, the impact of the return of the Indonesian sukuk index (lnISIXC) on its own variable is reduced, having an influence of only 91.12%. Towards the end of the observation period,

the influence of the return of the Indonesian sukuk index (lnISIXC) on its own variable is 79.14%.

At the conclusion of the observation period, among the other variables, the most significant influence on the return of the Indonesian sukuk index (lnISIXC) is from the global sukuk index (lnDJSUKTXR) at 13.93%, followed by the VIX Index (lnVIX) at 3.97%, BI rate (lnR_BI) at 2.76%, Consumer Price Index (lnIHK) at 0.1%, and exchange rate (lnKURS) at 0.09%. The results of the IRF test for the entire Covid-19 pandemic period can be observed in Table 9.

Table 9. The results of the FEVD test during the Covid-19 pandemic period.

Period	D(LNISIXC)	D(LNVIX)	D(LNDJSUKTXR)	D(LNR_BI)	D(LNIHK)	D(LNKURS)
1	100,0000	0,000000	0,000000	0,000000	0,000000	0,000000
2	91,11599	2,233254	6,411799	0,154616	0,062687	0,021658
3	88,53677	2,141995	7,425231	1,494201	0,059988	0,341817
4	80,13512	2,846082	10,88087	1,443573	0,070015	0,320229
5	84,43923	2,649043	11,14856	2,001501	0,215881	0,330553
50	80,13512	3,770445	13,13668	2,576258	0,116079	0,250686
100	79,63853	3,872115	13,54353	2,669855	0,101640	0,174321

200	79,35806	3,929539	13,76500	2,722720	0,093484	0,131190
300	79,25911	3,949799	13,84314	2,741371	0,090607	0,115973
400	79,20854	3,960153	13,88307	2,750902	0,089137	0,108196
500	79,17784	3,966438	13,90731	2,756689	0,088244	0,103475
600	79,15722	3,970660	13,92359	2,760575	0,087645	0,100304
732	79,13853	3,974488	13,93836	2,764099	0,087101	0,097429

Source: Own estimation

During the pre-Covid-19 pandemic period, the variable that contributed the most to the Indonesian sukuk index was the VIX index. This indicates that the influence of market anxiety index is greater compared to the global sukuk index. The contribution of market sentiment (lnVIX) to returns is more substantial, while macroeconomic variables have not yet exhibited a significant contribution to Indonesian sukuk index returns. This signal suggests the behavior of investors in the Indonesian sukuk market that, at present, market sentiment continues to hold sway.

CONCLUSION

This study found that during the pre-Covid-19 pandemic period, the return of the Indonesian sukuk index is influenced by the VIX index, BI rate, Consumer Price Index (IHK), and exchange rate. The VIX index, BI rate, and IHK exhibit positive effects, while the exchange rate demonstrates a negative impact. Throughout the Covid-19 pandemic period, the return of the Indonesian sukuk index is influenced by the VIX index, global sukuk index, IHK, and exchange rate. The VIX index and global sukuk index have a positive impact, while IHK and the exchange rate have a negative effect.

In the short term, during the pre-Covid-19 pandemic period, the return of the Indonesian sukuk index is influenced by the BI rate and IHK. During the Covid-19 pandemic period, the return of the Indonesian sukuk index is solely affected by the global sukuk index.

According to the Fixed Effects Vector Decomposition (FEVD) analysis, the variable of the Indonesian sukuk index (ISIXC) itself exerts the most significant influence on the return of the Indonesian sukuk index (ISIXC), accounting for 85.9 percent during the pre-Covid-19 pandemic period and 79.1 percent during the Covid-19 pandemic period. During the pre-Covid-19 pandemic period, the subsequent dominant influencing variable is the VIX index, contributing to 12.7 percent. Throughout the Covid-19 pandemic period, the primary influencing variable is the global sukuk index, contributing to 13.9 percent.

REFERENCES

- Afshar TA. 2013. Compare and contrast Sukuk (Islamic Bonds) with conventional bonds, are they compatible?. *Journal of Global Business Management*. 9(1) : 44.
- Ardiyansyah IH, Lubis D. 2017. Pengaruh Variabel Makroekonomi terhadap Pertumbuhan Sukuk Korporasi di Indonesia. *Jurnal Al-Muzara'ah*. 5(1). 2337-6333
- Ayub, M. 2009. *Understanding Islamic Finance A-Z Keuangan Syariah*. Jakarta: Gramedia Pustaka Utama.
- Basuki, A. T., & Prawoto, N. 2017. Analisis Regresi dalam penelitian ekonomi dan bisnis.
- Bhuiyan RA, Rahman MP, Saiti B, Ghani GM. 2018. Financial integration between Sukuk and bond indices of emerging markets: Insights from wavelet coherence and multivariate-GARCH analysis. *Borsa Istanbul Review*. 18(3) : 218–230. doi.org/10.1016/j.bir.2017.11.006.
- [BI] Bank Indonesia. 2020. Bersinergi Membangun Optimisme Pemulihan Ekonomi Laporan Perkonomian Indonesia 2020. Jakarta (ID): Bank Indonesia.
- [BI] Bank Indonesia. 2023. Data BI-7 Days Reverse Repo Rate Tahun 2018-2022. [internet]. [diunduh 2023 April 1]. Tersedia pada <https://www.bi.go.id>.
- [BI] Bank Indonesia. 2023. Data Kurs US Dollar Tahun 2018-2022. [internet]. [diunduh 2023 April 1]. Tersedia pada <https://www.bi.go.id>.
- Blanchard, O. 2006. *Macroeconomics 4th edition*. New Jersey: Pearson Prentice Hall.
- Boumediene A. 2015. Financing government budget deficit as a liquidity risk mitigation tool for Islamic Banks: A dynamic approach. *International Journal of Islamic and Middle Eastern Finance and Management*, 8(3), 329–348. <https://doi.org/10.1108/IMEFM-04-2014-0038>.
- Carrillo LRM, Castillo CM. 2020. Using country-level variables to classify countries according to the

- number of confirmed covid-19 cases: An unsupervised machine learning approach. *Wellcome Open Research*, 5(June), 56. <https://doi.org/10.12688/wellcomeopenres.15819.3> [CBOE] Chicago Board Option Exchange. 2023. Data Volatility Index [internet]. [diunduh 2023 April 1]. Tersedia pada <https://www.cboe.com>.
- [CBOE] Chicago Board Option Exchange. 2023. Volatility index methodology: Cboe volatility index. New York (AS): Chicago Board Option Exchange.
- [DinarStandard] Dinar Standard. 2022. State of the global Islamic economy report. Dubai (UEA): Dinar Standard.
- Firdaus, M. 2020. Aplikasi Ekonometrika dengan E-Views, Stata dan R.
- [FRED] Federal Reserve Economic Data. 2020. Data ICE BofA Bond Index [internet]. [diunduh 2022 Desember 9]. Tersedia pada <https://fred.stlouisfed.org>.
- Ihsanuddin. 2020. Fakta Lengkap Kasus Pertama Virus Corona di Indonesia. *Kompas.com* [IIFM] International Islamic Finance Market. 2022. Sukuk Report 2022. Manama (BRN): International Islamic Finance Market.
- [IFS] International Financial Statistik. 2023. Data Indeks Harga Konsumen Indonesia tahun 2018-2022. [internet]. [diunduh 2023 April 1]. Tersedia pada <https://data.imf.org>.
- Jacobs P, Abubakar A, Siallagan TE. 2011. Analisis Perilaku Indikator Debt Market. *Bulletin of Monetary Economics and Banking*. 13(3). DOI: 10.21098/bemp.v13i3.
- [KNEKS] Komite Nasional Ekonomi dan Keuangan Syariah. 2018. Masterplan Ekonomi Syariah Indonesia 2019-2024. Jakarta (ID) : Komite Nasional Ekonomi dan Keuangan Syariah.
- [KNEKS] Komite Nasional Ekonomi dan Keuangan Syariah. 2021. Outlook Industri Jasa Keuangan Syariah Tahun 2022. Jakarta (ID) : Komite Nasional Ekonomi dan Keuangan Syariah.
- Nachrowi D Nachrowi, H. U. (2006). *Ekonometrika Untuk Analisis Ekonomi dan Keuangan*. Jakarta: Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia.
- Naifar N, Tiwari AK, Alhashim M. 2022. How COVID-19 pandemic, global risk factors, and oil prices affect Islamic bonds (Sukuk) prices? New insights from time-frequency analysis. *Review of Financial Economics*. 40 : 312–331. <https://doi.org/10.1002/rfe.1158>.
- Nanaeva ZK. 2010. How risky Sukuk are: Comparative analysis of risks associated with Sukuk and conventional bonds. Doctoral dissertation, The British University in Dubai (BUiD).
- [OJK] Otoritas Jasa Keuangan. 2022. Data Statistik Sukuk Syariah [internet]. [diunduh 2023 Juli 4]. Tersedia pada <https://ojk.go.id>.
- [OJK] Otoritas Jasa Keuangan. 2021. Market Update Pasar Modal Syariah Indonesia Periode Januari-Juni 2021. Jakarta (ID): Otoritas Jasa Keuangan.
- Prasad A, Bakhshi P, Seetharaman A. 2022. The Impact of the U.S. Macroeconomic Variables on the CBOE VIX Index. *Journal Risk Financial Management*. 15(30) : 126. <https://doi.org/10.3390/jrfm15030126>.
- [PHEI] Penilai Harga Efek Indonesia. 2023. Data Indonesia Sukuk Index Composite (ISIXC) tahun 2018-2022 [internet]. [diunduh 2023 April 5].
- Prastowo, N. J. 2007. Dampak BI Rate Terhadap Pasar Keuangan : Mengukur Significantsi Respons Instrumen Pasar Keuangan Terhadap Kebijakan Moneter. Working Paper Bank Indonesia Nomor WP/21/2007.
- Rahardjo S. 2004. *Panduan Investasi Obligasi*. Jakarta: Gramedia Pustaka Utama.
- [Refinitiv] London Stock Exchange Group. 2021. *Islamic Finance Development Report 2021*. London (UK): London Stock Exchange Group.
- [S&P Global] S&P Dow Jones Indices. 2013. *Dow Jones Sukuk Total Return Index (ex-Reinvestment) Methodology*. New York (AS): S&P Dow Jones Indices.
- [S&P Global] S&P Dow Jones Indices. 2022. Data Dow Jones Sukuk Index [internet]. [diunduh 2022 Desember 9]. Tersedia pada <https://www.spglobal.com>.
- [S&P Global] S&P Dow Jones Indices. 2022. Data Dow Jones Islamic Index [internet]. [diunduh 2022 Desember 9]. Tersedia pada <https://www.spglobal.com>.
- [S&P Global] S&P Dow Jones Indices. 2022. Data Dow Jones World Index [internet]. [diunduh 2022 Desember 9]. Tersedia pada <https://www.spglobal.com>.
- [S&P Global] S&P Dow Jones Indices. 2020. Data Dow Jones Sukuk total return index (ex-Reinvestment) [internet]. [diunduh 2023 April 5]. Tersedia pada <https://www.spglobal.com>.

- [S&P Global] S&P Global Ratings. 2022. Islamic Finance Outlook 2022 Edition. Dubai (UEA): S&P Global Rating.
- Suciningtias SA. 2018. Macroeconomic Impacts on Sukuk Performance in Indonesia: Co-integration and Vector Error Correction Model (VECM) Approach. 6th ASEAN Universities International Conference on Islamic Finance (AICIF), Manila, Philippines.
- Tandelilin E. 2010. Portofolio dan Investasi, Teori dan Aplikasi Edisi 1. Yogyakarta: 2010.
- Wahida Ahmad RM. 2011. Sustainability of Sukuk and Conventional Bond during. *Global Economy and Finance* Vol. 4. No. 2, pp. 33-45.
- Wang, M.-l. e. (2010). Relationships among Oil Price, Gold Price, exchange Rate. *International Research Journal of Finance and Economics*, pp.80-89.
- Wibisono R. 2010. Pengaruh Variabel Makroekonomi dan Kecepatan Penyesuaian Keseimbangan dalam Memilih Obligasi Pemerintah Berdasarkan Tenor. Jakarta: Tesis Universitas Indonesia.
- Widarjono, A. (2017). *Ekonometrika : Pengantar dan Aplikasinya Disertai Panduan Eviews*. Yogyakarta: UPP STIM YKPN.
- Yarovaya L, Elsayed A, Hammoudeh S. 2020. Searching for Safe Havens during the COVID-19 Pandemic: Determinants of spillovers between Islamic and Conventional Financial Markets. SSRN: ssrn.com/abstract=3634114.