Default Risk on Islamic Banking in Indonesia

Budiandru Budiandru

Muhammadiyah Prof. Dr. Hamka University, DKI Jakarta, Indonesia

A R T I C L E   I N F O

A B S T R A C T

The problem of default by debtors becomes a primary concern for Islamic banking recently. This study analyzes the effect of economic pressure on the risk of default on Islamic banks, both in the short and long term, the risk response of default, and also other variables' contribution in explaining the diversity of risk of default of Islamic banks. This study used monthly data from 2007 to 2020 by using a vector error correction model. The results show that inflation and exchange rates affect the risk of default in the short term, while inflation, exchange rates, and interest rates affect the risk of default in the long run. Non-performing financing quickly stabilized when responding to the interest rates. The Islamic stock index has the most significant contribution in explaining the diversity of default risks. Islamic banks must be aware of the monetary fluctuation and also careful in analyzing the demand for financing by looking at the future economic prospects.

A B S T R A K

Permasalahan gagal bayar para debitur menjadi perhatian serius bagi perbankan syariah belakangan ini. Penelitian ini menganalisis pengaruh tekanan ekonomi terhadap risiko gagal bayar pada bank syariah baik dalam jangka pendek maupun jangka panjang, menganalisis respon risiko gagal bayar, dan menganalisis kontribusi variabel lain dalam menjelaskan keragaman risiko gagal bayar bank syariah. Data yang digunakan adalah data bulanan dari tahun 2007 sampai dengan 2020 menggunakan model koreksi kesalahan vektor. Hasi penelitian menunjukkan bahwa inflasi dan nilai tukar mempengaruhi risiko gagal bayar dalam jangka pendek, sedangkan jangka panjang, inflasi, nilai tukar, dan suku bunga mempengaruhi risiko gagal bayar. Pembiayaan bermasalah cepat stabil saat merespons suku bunga. Indeks saham syariah paling besar kontribusinya dalam menjelaskan keragaman risiko gagal bayar. Hal ini berarti bank syariah harus mewaspadai gejolak moneter yang terjadi dan tetap cermat dalam menganalisis permintaan pembiayaan dengan melihat prospek ekonomi ke depan.

1. INTRODUCTION

Financial institutions, particularly the banking sector, have a strategic position in bridging working capital needs and investment in the real sector (Hossain, 2016; Ng & Ariff, 2019). Therefore, the banking sector's primary function in macroeconomic policy infrastructure is to make money effective and efficient so that they can increase the economic value (Muttaqin, Arifin & Wajdi, 2016; Rashid, Hassan & Shah 2020; Siami-Namini & Hudson, 2019). Islamic banking is also an intermediary institution between investors who invest their funds in banks, and then they can also distribute their fund to other parties who need it (Naqvi et al., 2018; Trimulato, 2019). Investors who place their funds will get rewards from Islamic banks in profit sharing (Aysan & Disli, 2019;

Hossain, 2016). Then, the banks can distribute their fund to other parties who need it, generally in the activities of buying and selling agreements and business cooperation (Alam, Binti Zainuddin, & Rizvi, 2019).

Like other financial institutions and companies, Islamic banks are motivated to obtain returns (Salman & Nawaz, 2018). However, in that practice, Islamic banks always also face risks (Merdad et al., 2015). This risk is known as financing risk (Wasiaturrahma et al., 2020). This risk can cause enormous losses for Islamic banks if they cannot be detect and appropriately manage the risks (Louhichi & Boujelbene, 2016). Therefore, Islamic banking must be more sensitive in detecting the factors that can increase the financial problems (Kabir, Worthington & Gupta, 2015).

Financing risk is the risk of possible loss of Islamic banking due to non-repayment of Islamic banking financing to debtors and other counterparties (Lassoued, 2018). The NPF (non-performing financing) ratio in Islamic banks reflects the risk of financing. The sources of Islamic bank risk are both from systemic and non-systemic risks (Trabelsi & Naifar, 2017). One of the negative impacts of the risks faced by Islamic banking is the decline in the quality of financing provided by Islamic banking (Trad, Trabelsi & Goux, 2017). The decline in financing quality can cause banks to lose potential profits from the financing provided while increasing potential losses (Safiullah & Shamsuddin, 2019).

In monetary policy, banks play an essential role in the economy because they manage the entire financial sector in asset ownership, raise funds, and channel funds (Cai et al., 2016; Hamza & Saadaoui, 2018). In macroeconomics, inflation, interest rates, exchange rates, and stock indices also affect the increase or decrease in public savings and financing (Akhtar et al., 2017; Boateng et al., 2014; Hossain, 2016). If the inflation rate is high and uncontrollable, banks' efforts to collect public funds will difficulty so that lending activity becomes stagnant (Aysan, Disli, & Ozturk, 2018; Sinyakov & Yudaeva, 2016).

Research related to Islamic bank credit risk has been conducted by Azmat et al. (2020), Hamza & Saadaoui (2018), Kabir & Worthington (2017), Sorwar et al. (2016) in Muslim countries, Caporale et al. (2020) in Malaysia, Mensi et al. (2020) in the Gulf Cooperation country. Council, Usman et al. (2019) in the United States, United Kingdom, Japan, Malaysia, and Pakistan, Toumi, Viviani, and Chayeh (2019) in Bahrain, Ghenimi, Chaibi, and Omri (2017) in the Middle East and North Africa (MENA), Shahzad et al. (2017) in the US, United Kingdom, and Japan, Louhichi & Boujelbene (2016) in the Organization of Islamic Cooperation (OIC), and Saeed and Izzeldin (2016) in the Gulf Cooperation Council countries.

In this present study, the researcher only covers internal banking performance factors and certain macroeconomic variables, such as gross domestic product. The purpose of this study is to analyze the influence of the economy on problematic financing of Islamic banking both in the short and long term, to analyze the response of problematic financing to economic shocks, and to analyze the contribution of each variable in explaining the diversity of levels of financing problems in Islamic banking. Therefore, the novelty of the research mainly lies in the inclusion of inflation and interest rates in influencing the risk of financing, the impact of the variables studied on the risk of financing, both in the short and long term, and the response of non-performing financing to shocks from various macroeconomic variables.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The grand theory, which is the basis of this research, is monetary theory and macro indicators in Indonesia. The monetary theory's core is an analysis of the factors that affect the demand for money and the factors that affect the money supply. The demand and supply of money on the money market determine the price level. There are two types of monetary theory concepts: the focus of attention, namely the interest rate and the general price level. Besides that, monetary theory discussion is also inseparable from other economic variables such as inflation, national income, and the exchange rate. The transmission mechanism emphasizes monetary policy on output and prices through bank financing, in which, there are two transmission channels through the financing channel. First, the bank lending channel emphasizes monetary policy on financing because of its financial condition, especially the asset side. Second, the company's balance sheet path emphasizes the effect of monetary policy on its financial condition, such as cash flow and leverage, and this affects its assets to get financing.

To measure the quality of financing provided by Islamic banking, a non-performing financing (NPF) ratio can be used, namely the percentage of loans with substandard, doubtful, and impaired quality to total bank financing. The exchange rate in a country is significant where the exchange rate can determine the cost of a country's products for foreign buyers and will affect exports from that country and imports (Dahir et al., 2018; Prasad & Suprabha, 2015; Zeev, 2019). The development of the exchange rate significantly affects economic activity, where the higher the amount of local currency that must be issued to obtain foreign currency will increase the potential for higher non-performing financing ratios (Akbar, 2016; Mahapatra & Bhaduri, 2019).

When the value of the domestic currency depreciates, it can lead to a flight of public capital out of the country because when compared to other country's currencies, the local exchange rate is too low (El Alaoui et al., 2019; Kodongo & Ojah, 2016). The increase in foreign currency will increase the demand for foreign currency. Large bank debtors whose business activities are in dire need of foreign

currency will experience pressure by depreciating the exchange rate, which will increase the risk of bad credit (Lin, Shi & Ye, 2018; Sugiharti, Esquivias & Setyorani, 2020).

Another cause affecting non-performing financing from banks and borrowers' outer side is inflation, representing a macroeconomic condition (Bahloul, Mroua & Naifar, 2017). Inflation is a threat to every country because it occurs almost every country in the world (Galadima & Aminu, 2019; Önder & Özyıldırım, 2019). Activities to suppress the inflation rate are economic policies, often known as price stability (Aluko & Ajayi, 2018; Trad, Trabelsi & Goux, 2017) . The effect of inflation on banking, namely, when inflation increases at a high level, the price of goods will increase (Aysan et al., 2018). When prices increase, public expenditure will be more significant than expected. Therefore, the increased amount of expenditure is inversely proportional to the customer's ability to pay their obligations, impacting the increase in bad credit (Sarkis & Daou, 2013; Zeev, 2019).

Monetary policy plays an essential role in a country's economy (Cai et al., 2016). One of the monetary policies that often get paid attention by the policymakers, entrepreneurs, and investors is interest rate (Caporale et al., 2020; El Alaoui et al., 2019). Changes in interest rates will be responded by differently by entrepreneurs and investors (Ammer et al., 2019). The increase in interest rates helps investors benefit from savings and time deposits (Alam et al., 2017; Matemilola, Bany-Ariffin, & Etudaiye, 2015). For those who get business capital from bank loans, an increase in interest rates is terrible because high-interest rates can increase fees to the bank (Hamza & Saadaoui, 2018; Hossain, 2016). High-interest rates can affect the ability to pay debts to the bank. A decrease in debt repayment capacity due to an unhealthy economy can increase non-performing loans in banks (Cai et al., 2016; Magud & Vesperoni, 2015).

Islamic banking does not apply an exciting system in operation, but changes in interest rates can affect Islamic banking (Mushtaq & Siddiqui, 2017). The increase in interest rates is, of course, followed by an increase in loan interest rates to divert conventional bank customers to borrow funds from Islamic banking (Hossain, 2016). High demand for financing in Islamic banking without being accompanied by a good analysis can affect Islamic banking problem financing (Hassan et al., 2019). Islamic banking is said to have high non-performing financing if the amount of non-performing financing is greater than that of credit extended to debtors. If

an Islamic bank has high problematic financing, it will increase the cost of reserves for productive assets, thereby affecting stock prices.

Research related to credit risk or financing risk has been carried out by Azmat et al. (2020), who analyzed the macroeconomic influence on Islamic banking risk in 20 Muslim-majority countries. The results show that macroeconomic risk has a significant and positive effect on conventional bank deposits, while the impact on Islamic bank deposits is significant and gloomy. Yet, the effect is lower than conventional banks. Caporale et al. (2020) discuss bank lending channels from monetary transmission in Malaysia with dual banking systems. The result showed that Islamic bank credit is less responsive than conventional credit in responding to interest rate shocks at both high and low growth. Besides, the shocks to Islamic bank credit encourage output growth when growth is low and favorable.

Shahzad et al. (2017) examined returns and volatility in global Islamic stock markets (United States, United Kingdom, and Japan) and several macroeconomic influences with financial variables. The empirical analysis shows a strong interaction between the Islamic stock market, the conventional stock market, and a pool of risk factors. Another finding is that the Islamic stock market is not a viable alternative for investors who want to hedge their investments. Louhichi and Boujelbene (2016) explore credit risk factors in the banking system by analyzing the relationship between credit risk and macroeconomics in 10 Organization of Islamic Cooperation (OIC) countries. Islamic banks and conventional banks have different responses to various shocks. The relationship between efficiency and risk indicates that an increase in lousy credit begins with decreased efficiency costs. Another result is that shocks to GDP growth, capitalization, and profitability improve the quality of the credit portfolio and reduce credit risk. On the other hand, higher inflation rates impact the credit portfolio's quality in the long term.

The relationship between the Islamic stock index and non-performing loans is not directly but through the role of financing. The stock index reflects market conditions, whether market conditions are busy, sluggish, or stable (Coşkun et al., 2017). The growth in banking sector shares is inseparable from the prospect of improving performance. The increase in share prices occurred due to corporate actions to raise capital and planning a rights issue. The relationship between the Islamic stock index and financing occurs because of

an increase in share prices in line with an increase in the distribution of financing (Naifar, 2016). One positive boost for banking stocks is the ratio of non-performing financing (NPF) starting to improve. The potential for bad loans will decrease as the economy and financing improve.

H₁: The exchange rate affects non-performing financing

H₂: Inflation affects non-performing financing

H₃: Interest rates affect non-performing financing

H₄: Islamic stock index affects non-performing financing

3. RESEARCH METHOD

This study used monthly time series data from 2007 to 2020. The data consist of Islamic banking problem financing or non-performing financing (NPF), inflation (IFL), exchange rate (EXR), interest rate (BRTI), and Islamic stock index (JII). Research objects consist of 14 Islamic Commercial Banks and 20 Islamic Business Units in Indonesia in the 2020 financial period. The monthly time series data in this study from the economic theory so that the estimation of this model can provide numerical information and data to test existing theories.

This research used the Vector Autoregressive (VAR) method to solve time series data because the VAR model uses an approach that minimizes theory to capture existing phenomena. If the data used is not stationarity and co integrated, the Vector Error Correction Model (VECM) method is used. Therefore, before conducting an analysis using the VAR / VECM method, several tests are needed, including the stationarity test, the optimum lag test, the VAR stability test, and the co-integration test.

Next, the VECM estimation, Impulse Response Function (IRF), and Forecast Error Variance Decomposition (FEVD) were estimated. The model built in this study used the Vector Error Correction Model (VECM) equation for the long term and the Error Correction Model (ECM) for the short term.

$$NPF_t = \beta_0 + \beta_1 IFL_t + \beta_2 EXR_t + \beta_3 BRTI_t + \beta_4 JII_t + \varepsilon_t \quad (1)$$

$$\Delta NPF_t = \beta_0 + \beta_1 \Delta IFL_t + \beta_2 \Delta EXR_t + \beta_3 \Delta BRTI_t + \beta_4 \Delta JII_t + \beta_5 ECT_t + \varepsilon_t \quad (2)$$

Where NPF_t is non-performing financing in period t, IFL_t is inflation in period t, EXR_t is the exchange rate in period t, $BRTI_t$ is the interest rate in period t, JII_t is the Islamic stock index in period t, β_0 is the intercept, β_1 to β_4 is the coefficient of each variable, ECT_t is the error correction term, ε_t is the error in period t, Δ is the change in the value of the current period minus the previous period.

4. DATA ANALYSIS AND DISCUSSION

Data Stationarity Test

The essential first step to take on time series data is stationarity testing. Stationarity data show significant calculation results, while non-stationarity data show spurious calculation results. If forced in the calculation, it means that there is a sub-substantive correlation in the formation of variables between the dependent variable and the independent variable so that it forms non-stationarity regression. Data can be stationarity if the data has a constant overtime pattern or does not have a trend. This study uses the probability of Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) in testing the stationarity of the data using the 5 percent actual level.

The unit root test results at the level either used the ADF test or the PP test, none of which are stationarity (probability value> 0.05). However, the different levels show that all the variables studied are stationarity (probability value <0.05). These results indicate that long-term information will be lost when using data at the different levels so that the VAR method will be combined with an error correction model into VECM to analyze long-term information by utilizing data at the level.

Table 1. Stationarity Test Results

Variable	Augmented Dickey-Fuller (ADF)		Phillips-Peron (PP)	
	Level	Difference	Level	Difference
NPF	0.1496	0.0000	0.0876	0.0000
IFL	0.1015	0.0000	0.0616	0.0000
EXR	0.6219	0.0000	0.6293	0.0000
BRTI	0.2864	0.0000	0.2585	0.0000
JII	0.1477	0.0000	0.1596	0.0000

Co-integration Test

The second step is the co=integration test. The co-integration test functions to determine the presence or absence of non-stationarity variables at the co-

integration level. Co integration testing uses the Johansen Co integration test method. In VECM estimation, there is a co-integration of dependent and independent variables. If there is no co-integration, then the VECM model cannot be used but must use the VAR (Vector Atouregression) model. The criterion for co-integration between variables is to look at the trace statistic value. If the trace statistic value is greater than the critical value, it indicates co-integration between variables. The test results show co-integration between variables to combine the VAR model with ECM into VECM.

Table 2. Co-integration Test Results

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.2077	96.4970	88.8038	0.0124
At most 1	0.1288	59.0197	63.8761	0.1197
At most 2	0.1239	36.8268	42.9152	0.1777
At most 3	0.0676	15.5323	25.8721	0.5305
At most 4	0.0262	4.26854	12.5179	0.7030

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Optimal lag test
The third step is the optimal lag test. This optimal lag test is an essential step in using the VAR model. It shows how long a variable reacts to other variables and eliminates autocorrelation problems in a VECM system. This test is available in several types of information, including Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Likelihood Ratio (LR), Final Prediction Error (FPE), and Hannan Quin Information Criterion (HQ). The optimal lag test results show that LR, FPE, and AIC are in the second lag while SC and HQ are in the 1st lag. In this study, SC uses in determining the optimal lag.

Table 3. Optimal Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1483.095	NA	3.59e-15	-19.0722	-18.9740	-19.0323
1	2267.243	1507.5880	2.00e-19	-28.8677	-28.2786*	-28.6284*
2	2296.009	53.4486*	1.91e-19*	-28.9163*	-27.8363	-28.4776
3	2308.704	22.7690	2.24e-19	-28.7575	-27.1867	-28.1195
4	2322.929	24.5957	2.58e-19	-28.6184	-26.5568	-27.78104
5	2338.802	26.4211	2.93e-19	-28.5007	-25.9481	-27.4639
6	2357.043	29.1855	3.23e-19	-28.4135	-25.3700	-27.1773
7	2374.189	26.3268	3.64e-19	-28.3121	-24.7778	-26.8766
8	2379.836	8.3064	4.77e-19	-28.0624	-24.0372	-26.4275

*indicates lag order selected by the criterion

Estimated Vector Error Correction Model (VECM)
Vector Error Correction Model (VECM) is a valuable VAR model for seeing the long-run equilibrium relationship of co-integrated equations. If the variables are co-integrated, there is a long-term balance of these variables, and wherein there is an imbalance in the short term. Based on the VECM estimation results, to see which variables have significant value or not, a t-table is needed to compare it with the obtained t-statistical value. If the t-statistic value < t-table, it shows no effect, but if the t-statistic value> t-table, the estimation result significantly affects the dependent variable's. The t-table value with a significant level of 5 percent is 1,977.

From the VECM estimation results in the short term, it shows that the inflation variable (IFL) and the exchange rate (EXR) affect Islamic banking problem financing (NPF) while the interest rate (BRTI) and the Islamic stock index (JII) do not affect. As for the long term, it shows that inflation (IFL), the exchange rate (EXR), and interest rates (BRTI) have a significant effect on Islamic banking problem financing (NPF), while the Islamic stock index (JII) does not have any effect.

In the short term, interest rate (BRTI) does not affect problematic financing, while in the long term;

they have a significant and negative effect on problematic financing. Although Islamic banking in its operational activities does not recognize the interest system, changes in interest rate can affect Islamic banking (Hamza & Saadaoui, 2018). The increase in interest rates at Bank Indonesia is, of course, followed by an increase in loan interest rate charged by conventional banks to divert these bank customers to borrow funds from Islamic banks.

Table 4. VECM Estimation Results

Variable	Coefficient	|t-statistic|
Short Term		
CointEq1	0.0023	0.1733
D(IFL(-1))	-0.1180	3.2865*
D(EXR(-1))	0.0165	2.0457*
D(BRTI(-1))	0.0478	0.6220
D(JII(-1))	-0.0051	0.9627
C	-0.0002	0.6984
Long Term		
C	1.2772	-
IFL(-1)	1.7223	6.4601*
EXR(-1)	-0.1357	2.2902*
BRTI(-1)	-1.2487	2.0276*
JII(-1)	-0.0225	0.9344

Fluctuation in interest rate for conventional banking can affect customer decisions to save funds or get the loans and financing in banking (Aysan et al., 2018). When interest rate increases, conventional banking in maintaining profits will also raise interest rate (Akhtar et al., 2017). The increase in conventional banking interest rate causes customers to switch to Islamic banking for financing because the profit-sharing ratio is lower than the loan interest (Akhtar et al., 2017, Rashid & Jabeen, 2016). When interest rate rises, the Islamic banking profit-sharing ratio will compete with rising conventional banking loan interest rates so that Islamic financing products will be more competitive (Meslier, Risfandy & Tarazi, 2017). With many creditors applying for financing to Islamic banking, this group of banks can better select qualified debtors who can better pay the loans the banks provide for them. In the long term, this will lead to more minor financing problems.

Inflation (IFL) affects financing problems, both in the short and long term. Inflation indicates that the debtor can still pay financing installments before inflation rises (Akbar, 2016). However, after inflation, there is a reasonably high price increase. And, the debtor's income does not increase, causing a weak debtor's ability to pay installments because most of the income has to meet household needs as a result of the price increase (Coibion et al., 2020; Siami-Namini & Hudson, 2019). This condition will cause debtors not to pay financing installments to increase problematic Financing of Islamic banking.

The difficulty faced by Islamic banking can determine precisely how financing risk changes along with changes in the macroeconomic situation, especially the inflation problem to which banks respond (Trad et al., 2017). Another reason is that the debtors feel responsible or committed to fulfilling their obligations in repaying their loans to banks so that even though inflation has increased, problematic financing in Islamic banking has not increased (Hossain, 2016). Besides, a contract underlies the financing agreement between capital owners and managers, which is binding, and therefore, eventhough the macroeconomic condition decreases and inflation increases, the debtor is still obliged to repay the loan.

The negative relationship in the short term and positive in the long term is due to changes in people's purchasing power that causes a decrease or increase in sales. A decrease in sales will reduce the return of the company. The decline in company returns will affect the company's ability to pay credit installments and vice versa. Inflation is one of the macroeconomic indicators that affect the social economy of society. Modern economists define inflation as the overall increase in the amount of money paid for goods or commodities. A high inflation rate can slow down the economy, which ultimately affects the risk of the real sector business world and affects the financial sector, both the capital market and banking. One of the increased risks facing the banking industry is the increased risk of financing in increased financing problems. In the long run, however, inflation could encourage companies to produce more, thereby

increasing job opportunities. This increases the company's profits and employee income, thereby increasing their ability to repay loans and ultimately lowering non-performing loans. Thus, inflation in the long run lowers the level of non-performing loans.

The exchange rate (EXR) in the short and long term affects problem financing. When the rupiah exchange rate against the dollar increases, it means that the rupiah exchange rate depreciates. The price of foreign currency will be much higher so that the demand for financing will decrease and the probability of non-performing financing will decrease. Following the theory of purchasing power parity, the exchange rate will decrease in the same proportion as the rate of the price increase (Adinugraha & Sartika, 2019). Essentially, purchasing power parity emphasizes the relative long-run relationship between exchange rate and commodity prices. This indicates that the increase in the rupiah's exchange rate against the dollar makes domestic products more competitive because the prices of domestic goods and services are lower than the prices of goods from other countries (Chien, Lustig & Naknoi, 2019; Rajan, 2012).

The relatively low prices of domestic goods and services will increase foreign demand for domestic goods and services. Thus, the domestic sales will

increase, and the public's financial condition will improve. Consequently, the increase in the exchange rate will assist Islamic banking customers in returning their financing. In the long term, however, the weakening of the rupiah exchange rate may cause the price of imported inputs to increase, thereby eroding the company's profits which reduce the company's ability to pay its loans. The impact is that the weakening of the rupiah exchange rate encourages an increase in non-performing loans.

Non-performing financing response to exchange rate shocks

Non-performing Financing (NPF) responds positively to the shocks from exchange rates. The NPF had not responded to exchange rate shocks in the first period because it needed time to respond to the shocks. While entering the second period, the NPF began to respond to exchange rate shocks of 0.000512, then decreased in the third period to 0.000204 and rose again to 0.000236 in the fourth period. NPF began to stabilize when it entered the 17th period until the end of the observation period. This evidence indicates that when there is a shock to the exchange rate variable in the sense that the rupiah depreciates, the NPF of Islamic banking has decreased.
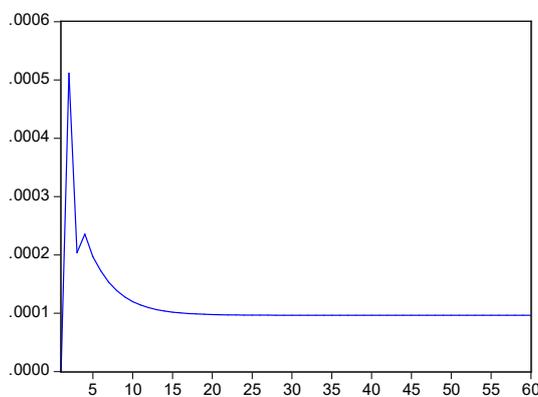
Figure 1. Non-performing financing response to exchange rate shocks

The increase in the rupiah exchange rate against the dollar makes domestic products more competitive because domestic goods and services are lower than those in other countries. Relatively low domestic goods and services will increase domestic goods and services (Byström, 2014). Domestic sales will increase, and people's and firms' financial conditions will improve either (Sinyakov & Yudaeva, 2016). Therefore, the increase in the exchange rate can help customers in Islamic banking to return their financing. Besides, exporters will benefit significantly from the appreciation of the exchange rate. If the

rupiah exchange rate against the dollar depreciates, it will cause customers to find it easier to repay their financing. Therefore, the NPF level of Islamic banking will decrease.

Non-performing financing response to inflation shocks

Inflation can shock and respond negatively to the beginning of the period, then increase to positive in the next period. The NPF of Islamic banking responded negatively in the second period of -0.000915, and then it increased in the third period to -

0.000442 and the fourth period of -0.000248. It started to be positive when entering the sixth period of 0.0000878 and so on until the observation period. The NPF of Islamic banking began to stabilize when it responded to inflation shocks in the eighteenth period.

When inflation experiences shock that is when it increases, the NPF of Islamic banking will increase in the long run. People's purchasing power will decrease because the money's value continues to be reduced by inflation. The decrease in people's purchasing power causes a decline in sales, and the business condition is weakening (Mora, 2015). This

condition causes Islamic banking customers, both individuals and firms, to experience difficulties in returning their financing. This can increase the NPF in Islamic banking. Following the generally accepted theory, if inflation causes an increase in production costs and ultimately harms the producers, the producers are reluctant to continue production (Chadwick, 2018). In this case, manufacturers can stop their production temporarily. If they cannot keep up with the inflation rate, the producers' business may go bankrupt, this can occur usually for small entrepreneurs (Boateng et al., 2014).
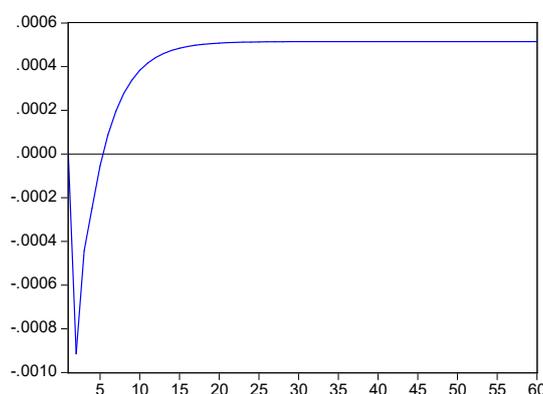
Figure 2. Non-performing financing response to inflation shocks

However, when there is inflation, the yield value decreases, which will cause Islamic banking to reduce the rate of return on its financing so that the demand for financing increases. Financing for consumption with a low margin will increase Islamic banking customers' purchasing power to buy the goods and services into the economy, and then the sales increase (Trad et al., 2017). A low margin makes it easy for Islamic banking customers to return their financing to decrease the NPF in Islamic banking (Duican & Pop, 2015). In terms of the corporate debtors, if the income earned is higher than the increase in production costs, then it is easier for them to return their

financing (Aluko & Ajayi, 2018).

Non-performing financing response to interest rate shocks

Interest rate shocks respond negatively to the beginning of the period, then positive and negative until the observation. In the second period, the NPF responded negatively to the interest rate shock of -0.0000355 then increased to a positive amount of 0.0000534 in the third period. Furthermore, entering the fourth period, it decreased again by 0.0000182, and then it strated to stabilize when entering the 11th period until the observation period.
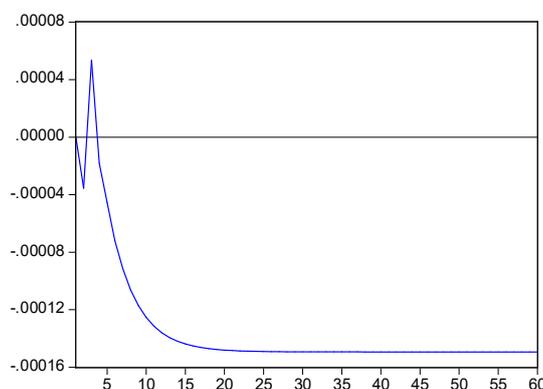
Figure 3. Non-performing financing response to interest rate shocks

56

Interest rate is not a reference for Islamic banking customers in conducting financing. The central bank's monetary policy through interest rate will not interfere with the financing of Islamic banking problems. Interest rate is not either the reason for an increase in the ratio of problem financing, as has been anticipated by Islamic banking management to improve the quality of fund distribution (Hamza & Saadaoui, 2018). Islamic banking can choose customers eligible for financing so that the size of the central bank's loan interest rate will not interfere with customers' power to fulfill their obligations (Akhtar et al., 2017). Indirectly impacts interest rates that will determine customer attitudes towards Islamic bank financing (El Alaoui et al., 2019). Financing is proof that Islamic bankings' profit-sharing concept has successfully responded to the public (Toumi, Viviani & Chayeh, 2019).

An increase in interest rate will increase installment returns on financing owned by customers in banks. It also increases the banks' NPF due to customers' low ability to pay installments. Conventional bank loan interest rates that will increase can benefit Islamic banks because Islamic banks' margins and profit-sharing will increasingly compete with conventional banking interest rates (Hossain, 2016). The increase of the distribution of Islamic banking financing can increase the risk of problematic financing more competitive the margins and profit-sharing of Islamic banking can increase the distribution of Islamic banking financing (Trisanty, 2018).

Non-performing financing response to Islamic stock index

Islamic stock index (JII) variable shocks responded negatively to the beginning of the observation period. In the second period, the NPF responded to the JII shock of -0.000307, then increased in the third period by -0.000237 and decreased in the fourth period by -0.000286. JII shock began to stabilize when it entered the thirteenth period until the end of the observation.

The developing Islamic stock index market condition positively impacts Islamic bankings' performance if these two are complementary. However, if the Islamic stock index and Islamic banking are two sides that replace each other, then the Islamic stock index's development on Islamic banking is negative (Alam et al., 2017; Mensi et al., 2020). Banking indeed still dominates financing for both individuals and companies. A new investment usually gets funding from several sources, including internal financing, banking, or even through the capital market, one of which is by printing new shares (Driver, Grosman & Scaramozzino, 2020; Mertzanis, 2016). However, the printing of new shares is not the primary source of financing. In addition, companies as bank creditors participate in the stock market. When the stock market is bullish, there is a potential for transferring company funds in the bank into stock investment instruments, which can harm banking performance (Godil et al., 2020).
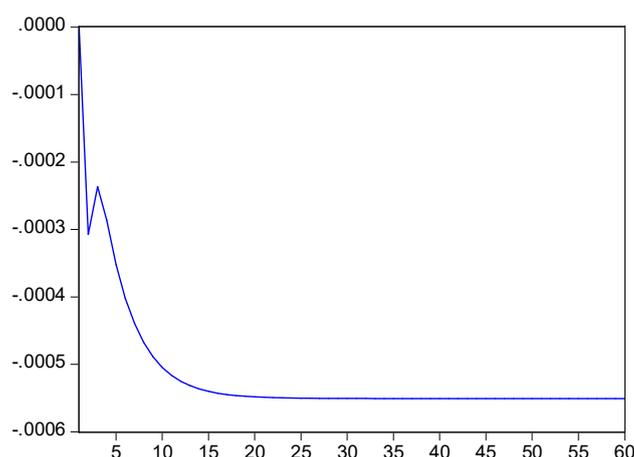
Figure 4. Non-performing financing response to Islamic stock index

Forecast Error Variance Decomposition

After analyzing dynamic behavior through impulse response analysis, the model characteristics are created through forecast error variance decomposition (FEVD). This analysis predicts each variable's contribution to the variable financing problem in Islamic banking. The most significant contribution in influencing the diversity of non-performing financing variables (NPF) is the non-performing financing variable (NPF) itself, with an average of 95.7 percent throughout the observation period. Furthermore, the Islamic stock index (JII)

variable is 1.96 percent, the inflation variable (IFL) is 1.92 percent, the exchange rate variable (EXR) is 0.29 percent, and the interest rate variable (BRTI) is 0.125 percent.

Inflation is a process of increasing the prevailing prices in an economy and it can describe changes in the prevailing price from one year to another (Siami-Namini & Hudson, 2019). High inflation will decrease the community's real income so that the community's standard of living also decreases before inflation occurs. A debtor still manages to pay his loan installments. However, after inflation occurs, the prices increase relatively high while the debtor's income does not increase. Then finally, the debtor's ability to pay his installments is low because most or even all of his income has to meet household needs as

a result of increased prices (Aysan et al., 2018; Güler & Tepecik, 2019; Naifar, 2016).

The benchmark interest rate is announced by the central bank periodically for a certain period serves as a monetary policy signal (Hamza & Saadaoui, 2018). If the interest rate increases, Islamic banking will also adjust the profit-sharing rate, because indirectly, the increase in interest rates is used as a reference by Islamic banking in determining the profit-sharing margin. Therefore, the Islamic banking is becoming increasingly competitive (Alam et al., 2017; Lassoued, 2018; Louhichi & Boujelbene, 2016). The increase in profit sharing margin will trigger problematic financing because the customers' burden is getting bigger (Aysan & Disli, 2019; Toumi et al., 2019).
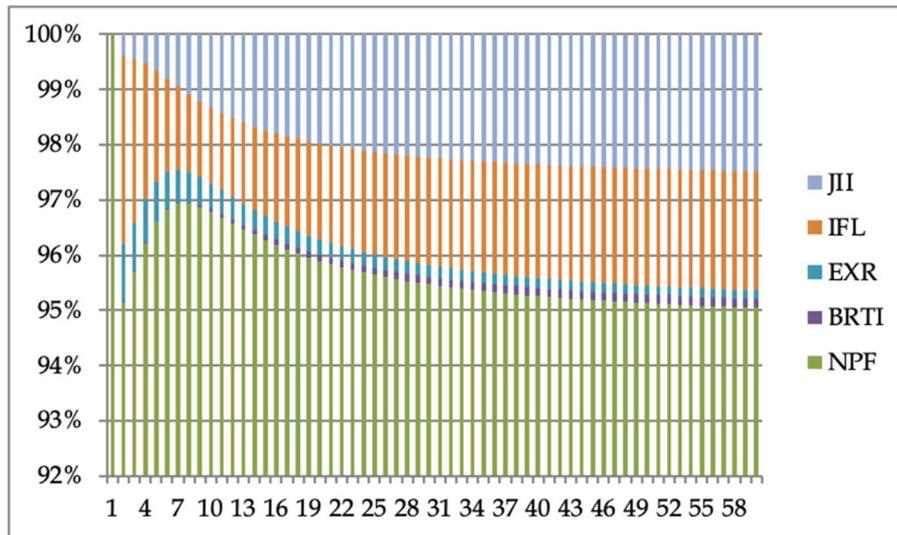
Figure 5. Forecast Error Variance Decomposition

The exchange rate shows the country's currency's price or value that is expressed in another country's currency (Ghosh, 2017; Sasmal, 2015). Exchange rate fluctuation, significantly when depreciation, increases production costs and import financing, resulting in decreased income, especially for the companies engaged in export and import and raw materials they obtained from abroad (Byström, 2014; Zeev, 2019). The decrease in income will cause the company to have difficulty in paying its obligations to their banks. On the contrary, Islamic banking in ddistributing funds through financing tend to avoid foreign exchange risks. However, in Islamic banking operations, they are directly related to the risk of exchange rate fluctuation in treasury activities. In this condition, meeting the banks' liquidity needs is inevitable (El Alaoui et al., 2019; Hossain, 2016; Wahyudi & Sani, 2014).

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Based on the analysis, in the short term, problematic financing is negatively influenced by inflation and positively influenced by the exchange rate. In contrast, in the long term, problematic financing is positively influenced by inflation and negatively influenced by exchange rate and interest rate. Non-performing financing is the fastest to achieve the stability when responding to interest rates, the Islamic stock index, exchange rates, and inflation. The contribution of variables in explaining the diversity of problematic financing is mainly influenced by the Islamic stock index, inflation, exchange rates, and interest rates.

Islamic banks must be aware of the inflation rate that occurs and thye should remain careful in analyzing the application for financing by looking at the future economic prospects whether economic

conditions will progress or decline. Islamic banks also need to supervise the business from the distribution of financing they have carried out, whether the business's income can cover various expenses, including loan installment payments to the bank. Besides, Islamic banks should pay attention to the business prospects that will be carried out by its customers before distributing their financing and they also have to ensure that potential borrowers have the potential to repay their loans on time. Of course, Islamic banks must also pay attention to the trend of exchange rate in determining financing policies. Usually, the vulnerable effect of changes in the exchange rate is for the export-import sector or companies because they use raw materials purchased from abroad. Islamic banks need to pay attention, consider, and evaluate their financing to avoid non-performing financing opportunities. This is useful to overcome as early as possible the impact of non-performing financing.

REFERENCES

Adinugraha, H. H., & Sartika, M. (2019). Halal life-style di Indonesia. *An-Nisbah: Jurnal Ekonomi Syariah*, *5*(2), 57–81.

Akbar, D. A. (2016). Inflasi, gross domesctic product (GDP), capital adequacy ratio (CAR), dan finance to deposit ratio (FDR) terhadap non performing financing (NPF) pada bank umum syariah di Indonesia. *I-Economics*, *2*(2), 19–37.

Akhtar, S., Akhtar, F., Jahromi, M., & John, K. (2017). Impact of interest rate surprises on Islamic and conventional stocks and bonds. *Journal of International Money and Finance*, *79*), 218-231.

Alam, M. M., Akbar, C. S., Shahriar, S. M., & Elahi, M. M. (2017b). The Islamic shariah principles for investment in stock market. *Qualitative Research in Financial Markets*, *9*(2), 132–146.

Alam, N., Binti Zainuddin, S. S., & Rizvi, S. A. R. (2019). Ramifications of varying banking regulations on performance of Islamic banks. *Borsa Istanbul Review*, *19*(1), 49–64.

Aluko, O., & Ajayi, M. A. (2018). Determinants of banking sector development: Evidence from Sub-Saharan African countries. *Borsa Istanbul Review*, *18*(2), 122–139.

Ammer, J., Claessens, S., Tabova, A., & Wroblewski, C. (2019). Home country interest rates and international investment in U.S. bonds. *Journal of International Money and Finance*, *95*, 212–227.

Aysan, Ahmet F., Disli, M., & Ozturk, H. (2018). Bank lending channel in a dual banking system: why are Islamic banks so responsive? *World Economy*, *41*(3), 674–698.

Aysan, A. F., & Disli, M. (2019). Small business lending and credit risk: Granger causality evidence. *Economic Modelling*, *83*, 245–255.

Azmat, S., Azad, A. S. M. S., Ghaffar, H., Hayat, A., & Chazi, A. (2020). Conventional vs Islamic banking and macroeconomic risk: Impact on asset price bubbles. *Pacific Basin Finance Journal*, *62*, 1–19.

Bahloul, S., Mroua, M., & Naifar, N. (2017). The impact of macroeconomic and conventional stock market variables on Islamic index returns under regime switching. *Borsa Istanbul Review*, *17*(1), 62–74.

Boateng, A., Hua, X., Uddin, M., & Du, M. (2014). Home country macroeconomic factors on outward cross-border mergers and acquisitions: Evidence from the UK. *Research in International Business and Finance*, *30*(1), 202–216.

Byström, H. (2014). The impact of currency movements on asset value correlations. *Journal of International Financial Markets, Institutions and Money*, *31*(1), 178–186.

Cai, W., Zeng, C. C., Lee, E., & Ozkan, N. (2016). Do business groups affect corporate cash holdings? Evidence from a transition economy. *China Journal of Accounting Research*, *9*(1), 1–24.

Caporale, G. M., Çatık, A. N., Helmi, M. H., Menla Ali, F., & Tajik, M. (2020). The bank lending channel in the Malaysian Islamic and conventional banking system. *Global Finance Journal*, *45*, 1–26.

Chadwick, M. G. (2018). Effectiveness of monetary and macroprudential shocks on consumer credit growth and volatility in Turkey. *Central Bank Review*, *18*(2), 69–83.

Chien, Y. L., Lustig, H., & Naknoi, K. (2019). Why are exchange rates so smooth? A household finance explanation. *Journal of Monetary Economics*, 1–16.

Coibion, O., Gorodnichenko, Y., Kumar, S., & Pedemonte, M. (2020). Inflation expectations as a policy tool? *Journal of International Economics*, *124*, 1–27.

Coşkun, Y., Seven, Ü., Ertuğrul, M., & Ulussever, T. (2017). Capital market and economic growth nexus: Evidence from Turkey. *Central Bank Review*, *17*(1), 19–29.

Driver, C., Grosman, A., & Scaramozzino, P. (2020). Dividend policy and investor pressure. *Economic Modelling*, *89*, 559–576.

Duican, E. R., & Pop, A. (2015). The implications of credit activity on economic growth in Romania. *Procedia Economics and Finance*, *30*(15), 195–201.

El Alaoui, A. O., Jusoh, H. Bin, Yussof, S. A., & Hanifa, M. H. (2019). Evaluation of monetary policy: evidence of the role of money from Malaysia. *Quarterly Review of Economics and Finance*, *74*, 119–128.

Galadima, M. D., & Aminu, A. W. (2019). Shocks effects of macroeconomic variables on natural gas consumption in Nigeria: Structural VAR with sign restrictions. *Energy Policy*, *125*, 135–144.

Ghenimi, A., Chaibi, H., & Omri, M. A. B. (2017). The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA Region. *Borsa Istanbul Review*, *17*(4), 238–248.

Ghosh, A. (2017). How do derivative securities affect bank risk and profitability?: Evidence from the US commercial banking industry. *Journal of Risk Finance*, *18*(2), 186–213.

Godil, D. I., Sarwat, S., Sharif, A., & Jermsittiparsert, K. (2020). How oil prices, gold prices, uncertainty and risk impact Islamic and conventional stocks? Empirical Evidence from QARDL Technique. *Resources Policy*, *66*, 1–9.

Güler, K., & Tepecik, A. (2019). Exchange rates' change by using economic data with artificial intelligence and forecasting the crisis. *Procedia Computer Science*, *158*, 316–326.

Hamza, H., & Saadaoui, Z. (2018). Monetary transmission through the debt financing channel of Islamic banks: does PSIA play a role? *Research in International Business and Finance*, *45*(3), 557–570.

Hassan, M. K., Khan, A., & Paltrinieri, A. (2019). Liquidity risk, credit risk and stability in Islamic and conventional banks. *Research in International Business and Finance*, *48*, 17–31.

Hossain, A. A. (2016). Inflationary shocks and real output growth in nine muslim-majority countries: implications for Islamic banking and finance. *Journal of Asian Economics*, *45*, 56–73.

Kabir, M. N., & Worthington, A. C. (2017). The 'competition–stability/fragility' nexus: A comparative analysis of Islamic and conventional banks. *International Review of Financial Analysis*, *50*, 111–128.

Kabir, M. N., Worthington, A., & Gupta, R. (2015). Comparative credit risk in Islamic and conventional bank. *Pacific Basin Finance Journal*, *34*, 327–353.

Kodongo, O., & Ojah, K. (2016). Does infrastructure really explain economic growth in Sub-Saharan Africa? *Review of Development Finance*, *6*(2), 105–125.

Lassoued, M. (2018). Comparative study on credit risk in Islamic banking institutions: The Case of Malaysia. *Quarterly Review of Economics and Finance*, *70*, 267–278.

Lin, S., Shi, K., & Ye, H. (2018). Exchange rate volatility and trade: The role of credit constraints. *Review of Economic Dynamics*, *30*, 203–222.

Louhichi, A., & Boujelbene, Y. (2016). Credit risk, managerial behaviour and macroeconomic equilibrium within dual banking systems: Interest-free vs. interest-based banking industries. *Research in International Business and Finance*, *38*, 104–121.

Magud, N. E., & Vesperoni, E. R. (2015). Exchange rate flexibility and credit during capital inflow reversals: purgatory . . . not paradise. *Journal of International Money and Finance*, *55*, 88–110.

Mahapatra, S., & Bhaduri, S. (2019). Dynamics of the impact of currency fluctuations on stock markets in india: Assessing the pricing of exchange rate risks. *Borsa Istanbul Review*, *19*(1), 15–23.

Matemilola, B. T., Bany-ariffin, A. N., & Etudaiye, F. (2015). The impact of monetary policy on bank lending rate in South Africa. *Borsa Istanbul Review*, *15*(1), 53–59.

Mensi, W., Ur Rehman, M., Maitra, D., Hamed Al-Yahyaee, K., & Sensoy, A. (2020). Does bitcoin co-move and share risk with sukuk and world and regional Islamic stock markets? Evidence using a time-frequency approach. *Research in International Business and Finance*, *53*, 1–21.

Merdad, H. J., Hassan, K., & Hippler, W. (2015). The Islamic risk factor in expected stock returns: An empirical study in Saudi Arabia. *Pacific Basin Finance Journal*, *34*, 293–314.

Mertzanis, C. (2016). The absorption of financial services in an Islamic environment. *Journal of Economic Behavior and Organization*, *132*, 216–236.

Meslier, C., Risfandy, T., & Tarazi, A. (2017). Dual market competition and deposit rate setting in Islamic and conventional banks. *Economic Modelling*, *63*, 318–333.

Mohamed Dahir, A., Mahat, F., Ab Razak, N. H., & Bany-Ariffin, A. N. (2018). Revisiting the dynamic relationship between exchange rates and stock prices in BRICS Countries: A wavelet analysis. *Borsa Istanbul Review*, *18*(2), 101–113.

Mora, N. (2015). Creditor recovery: The macroeconomic dependence of industry equilibrium. *Journal of Financial Stability*, *18*, 172–186.

Mushtaq, S., & Siddiqui, D. A. (2017). Effect of interest rate on bank deposits : evidences from Islamic and non-Islamic economies. *Future Business Journal*, *3*(1), 1–8.

Muttaqin, A., Arifin, A. Z., & Wajdi, F. (2016). Problems, challenges and prospects of indonesian muslim community in Sydney for promoting

tolerance. *International Journal of Indonesian Society and Culture*, 8(2), 169–184.

Naifar, N. (2016). Do global risk factors and macroeconomic conditions affect global iIlamic index dynamics? A quantile regression approach. *Quarterly Review of Economics and Finance*, 61, 29–39.

Naqvi, B., Rizvi, S. K. A., Uqaili, H. A., & Chaudhry, S. M. (2018). What enables Islamic banks to contribute in global financial reintermediation? *Pacific Basin Finance Journal*, 52, 5–25.

Ng, A., & Ariff, M. (2019). Does credit rating revision affect the price of a special class of common stock? *Borsa Istanbul Review*, 19(2005), S44–S55.

Önder, Z., & Özyıldırım, S. (2019). Foreign banks and short-term macroeconomic fluctuations: Do financial development and regions matter? *Economic Systems*, 43(1), 63–76.

Prasad, K., & Suprabha, K. R. (2015). Measurement of exchange rate exposure: Capital market approach versus cash flow approach. *Procedia Economics and Finance*, 25(15), 394–399.

Rajan, R. S. (2012). Management of exchange rate regimes in emerging Asia. *Review of Development Finance*, 2(2), 53–68.

Rashid, A., Hassan, M. K., & Shah, M. A. R. (2020). On the role of islamic and conventional banks in the monetary policy transmission in Malaysia: Do size and liquidity matter? *Research in International Business and Finance*, 52, 1–33.

Rashid, A., & Jabeen, S. (2016). Analyzing performance determinants: Conventional versus Islamic banks in Pakistan. *Borsa Istanbul Review*, 16(2), 92–107. https://doi.org/10.1016/j.bir.2016.03.002

Saeed, M., & Izzeldin, M. (2016). Examining the relationship between default risk and efficiency in Islamic and conventional banks. *Journal of Economic Behavior and Organization*, 132, 127–154.

Safiullah, M., & Shamsuddin, A. (2019). Risk-adjusted efficiency and corporate governance: Evidence from Islamic and conventional banks. *Journal of Corporate Finance*, 55, 105–140. 9

Salman, A., & Nawaz, H. (2018). Islamic financial system and conventional banking: A comparison. *Arab Economic and Business Journal*, 13(2), 155–167.

Sarkis, N., & Daou, L. (2013). Giving back to the community, an obligation or an option today?—case of the educational sector in Lebanon. *International Strategic Management Review*, 1(2), 59–64.

Sasmal, J. (2015). Food price inflation in India: The growing economy with sluggish agriculture. *Journal of Economics, Finance and Administrative Science*, 20(38), 30–40.

Shahzad, S. J. H., Ferrer, R., Ballester, L., & Umar, Z. (2017). Risk transmission between Islamic and conventional stock markets: a return and volatility spillover analysis. *International Review of Financial Analysis*, 52, 9–26.

Siami-Namini, S., & Hudson, D. (2019). The Impacts of sector growth and monetary policy on income inequality in developing countries. *Journal of Economic Studies*, 46(3), 591–610.

Sinyakov, A., & Yudaeva, K. (2016). Central bank policy under significant balance-of-payment shocks and structural shifts. *Russian Journal of Economics*, 2(3), 246–278.

Sorwar, G., Pappas, V., Pereira, J., & Nurullah, M. (2016). To debt or not to debt: are Islamic banks less risky than conventional banks? *Journal of Economic Behavior and Organization*, 132, 113–126.

Sugiharti, L., Esquivias, M. A., & Setyorani, B. (2020). The impact of exchange rate volatility on Indonesia's top exports to the five main export markets. *Heliyon*, 6(1), 1–14.

Toumi, K., Viviani, J. L., & Chayeh, Z. (2019). Measurement of the displaced commercial risk in Islamic banks. *Quarterly Review of Economics and Finance*, 74, 18–31.

Trabelsi, N., & Naifar, N. (2017). Are Islamic stock indexes exposed to systemic risk? Multivariate GARCH estimation of CoVaR. *Research in International Business and Finance*, 42(7), 727–744.

Trad, N., Trabelsi, M. A., & Goux, J. F. (2017). Risk and profitability of Islamic banks: a religious deception or an alternative solution? *European Research on Management and Business Economics*, 23(1), 40–45.

Trimulato, T. (2019). Fintech for Sharia micro finance institution: Qualitative analysis toward utilization of financial technology in BPRS and BMT. *Journal of Islamic Economics*, 4(2), 123.

Trisanty, A. (2018). The profit sharing implementation for financing in Indonesian Sharia banking. *Airlangga International Journal of Islamic Economics and Finance*, 1(1), 32–42.

Usman, M., Qamar Jibran, M. A., Amir-ud-Din, R., & Akhter, W. (2019). Decoupling hypothesis of Islamic stocks: Evidence from copula CoVaR approach. *Borsa Istanbul Review*, 19, S56–S63.

Wahyudi, I., & Sani, G. A. (2014). Interdependence between Islamic capital market and money market: Evidence from Indonesia. *Borsa Istanbul Review*, 14(1), 32–47.

Wasiaturrahma, Ajija, S. R., Sukmana, R., Sari, T. N., & Hudaifah, A. (2020). Breadth and depth

outreach of Islamic cooperatives: do size, non-performing finance, and grant matter? *Heliyon*, *6*(7), e04472.

Zeev, N. Ben. (2019). Global credit supply shocks and exchange rate regimes. *Journal of International Economics*, *116*, 1–32.