PANEL VAR FOR ANALYZING BUSINESS CYCLE INFLUENCE ON THE DISTRIBUTION OF SHARIA BANKING FINANCING IN INDONESIAN SHARIA BANKING

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Abstract

This paper is structured to explain the effect of the business cycle on the distribution of Islamic banking financing in Indonesia. Furthermore, this research examined the differences between account receivables financing and profit-sharing financing, as well as different forms of Islamic banking. In this case, Islamic banking financing, account receivables financing, and profit-sharing financing will have the same responses or changes in the face of the business cycle in Indonesia. This research is focused and limited to the response of Islamic banking financing to the business cycle in Indonesia. Second, this research used quarterly data from 2007 to 2020 obtained from financial data of each sharia commercial bank and sharia business unit published through the Financial Services Authority (OJK) and Bank of Indonesia; meanwhile, the macro-level data was taken from data from the Central Agency publication Indonesian Statistics. Third, the estimation method used is the Panel VAR to accommodate the heterogeneity between firms. The results show that capital and liquidity respond positively to changes in banking financing, account receivables financing, and profit-sharing financing. The results also show that performing loans and profitability will decrease if there is a shock to the three types of financing.

Keywords : panel vector autoregression; sharia banks; sharia financing; business cycle

JEL : C22, E58, G24, E32

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INTRODUCTION

The Indonesian banking system began to be dominated by conventional banking which implements an interest system. Entering 1992, the first Sharia bank was officially operational, followed by the development of sharia business units in several regional development banks. Slowly Indonesia began to enter the era of the dual banking system (dual banking system) since the enactment of Law No. 10 of 1998 by applying conventional banking systems and Islamic banking systems. The law is the beginning of the establishment

of Islamic banks. Until the end of September 2017 recorded in the FSA there are 13 Sharia Commercial Banks (SCB), 167 sharia-credit banks (BPR) and 21 Sharia Business Units (SBU) from Conventional Commercial Banks.

The policy of dual system banking was initiated during the crisis of 1997/1998. In 1997, Indonesia experienced an economic crisis, weakening the rupiah exchange rate. The enlisted banks of the time were conventional banks that implemented the interest system; a surge in bank interest rates as a policy effect increase in the Bank of Indonesia (BI) rate led to the failure of the bank system. Bank Muamalat Indonesia (BMI), as the only sharia bank, proved its resilience through the economic crisis; although the non-performing financing (NPF) BMI reached more than 60%, the BMI survived and did not require the government's recapitalization. In 2007/2008, the crisis struck Indonesia as the impact of the global financial crisis, a subprime mortgage that initiated the shock of the capital market and the U.S. money market. The U.S.'s subprime mortgage or low flowering KPR leads to increased home demand.

Conventional banking tends to procyclical the economic movements. The results of lending distribution follow the development of the national economy. On the other hand, sharia banking consisting of three SCBs and 19 SBU, can survive through the crisis phase. The post-crisis Sharia financing as of February 2009 increased by 47.3%, higher than the same period of the year before (growing 33.3%). Sharia financing, especially in the real and productive sectors, is assessed to help out the threat of crisis, while the interest rate crisis tends to increase as the effect of absorbing credit risk adds to the burden of business actors. The presence of Sharia banking that runs profit-loss sharing (PLS) schemes or risk-sharing will reduce the cash flow of business players. The obligations of business actors, especially when the economy can decline because of the sharia banks' loss-sharing method. Potential customers fail to decline. PLS Scheme can allow business actors to remain in the middle of economic slowdown (Ascarya et al., 2016).

Ascarya et al., (2016), explain that conventional banking loans are procyclical to the economic movements, but sharia financing is expected to move counter-cyclical. In other research, Weill and Zins (2021) find that economic growth dropped, and financing distribution remained encouraged to help the economic slowdown. Sharia banking financing (GFIN) products are divided into debt-like financing (Murabaha and Ijarah) and equity financing (Mudharabah and Musyarakah). Debt-like financing uses the markup calculation system or value-added, where banks set a price gap on financing or buying and selling, while equity-financing uses a profit-loss sharing (PLS) calculation scheme (PAPSI, 2013 and Sharia Banking Statistics, 2022).

Sharia banking financing products are divided into debt-like financing (Murabaha and ijarah) and equity financing (mudharabah and musyarakah). Debt-like financing uses a markup or value-added calculation system, where the bank determines the price difference for financing or buying and selling. In contrast, equity financing uses a profit-loss sharing (PLS) calculation scheme.

From the data as of December 2021 (Table 1), the debt-like financing system dominates Islamic banking financing. Especially murabahah contracts of 47.30%, while equity-financing is around 48.98% (musyarakah contracts and mudharabah contracts). Meanwhile, funding from BUS is 63.04% compared to funding from UUS which is 36.96%.

Our study reviews the research of Weill and Zins (2021) where the high portion of debt-like financing indicates that debt-like financing is not much different from conventional banks. Sharia banks, as business entities, strive to provide profit to stakeholders and minimize any form of

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risk. By implementing debt-like financing schemes, sharia banks can minimize risks by raising value markup calculations. In the end, financing practices are not much different from conventional systems. The element of interest is still inherent in sharia financing. As a result of these demands, Sharia banking measures were limited and tended to follow the economic movements (procyclical); when the economy weakened, sharia financing channeling activities also declined. To answer the research question, Weill and Zins (2021) used the dynamic panel data estimation method of credit growth. This model considers heterogeneity between banks and dynamics in credit growth variables. Economic growth as a measure of the business cycle is placed as an independent variable that affects credit growth.

Our study addresses several issues more than Weill and Zins (2021). This advantage becomes the Research Gap, where our research considers heterogeneity between banks, the endogeneity relationship between variables, dynamics, exogen, and the concept of shock and response. The method that applies all of these features is Panel Autoregression (PVAR). In the research of Weill and Zins (2021), the resulting analysis is a static impact analysis due to changes in independent variables. In our study, PVAR could analyze the impact of contemporary, dynamic responses in a timeline (Abrigo & Love, 2016). By knowing this type of impact, we can study the effect of a variable that changes over time.

The purpose of this research is based on the background, and the formulation of the problem described earlier is to analyze the impact of the business cycle on the distribution of Sharia banking financing in Indonesia. More to see the response or change of Sharia banking financing if there is a shock in the business cycle. The study analyzed total financing (GFIN), namely accumulated debt-like financing (GPIU, value mark-up system) and equity financing (GBH, profit-sharing system). Debt-like financing (GPIU) data is the sum of Murabaha, qardh, rent, istishna and ijarah loans. Data on equity-financing (GBH) is the accumulation of mudharabah financing and musyarakah financing (Setiawan et. al 2019). Further, we will examine the difference in *debt-like financing* (GPIU) and *equity-financing* (GBH), as well as the difference in the form of banking. The research wants to pay attention to the differences between the two types of funding. The two types of funding have different transmission and behavior (Aysan, Disli, and Ozturk, 2017).

This research hopes to explain the response to both funding in case of business cycle shocks and fluctuations. Debt-like financing is a bank loan that is recognized as debt. The borrower has an obligation to pay off the debt plus a predetermined interest fee within an agreed period. Debt-like financing encourages customers to pay off their financing regularly using their cash flow so that customers are avoided failing to pay (Ali and Zada, 2019). While in equity financing, banks provide financing to customers in the form of participation in a company or project with a profit-sharing calculation system. The profit-sharing ratio is an increasing function of nominal financing. The financing risk increases as the nominal financing increases (Ali and Zada, 2019). In this case, SCB and SBU will have different responses or changes in the face of the business cycle in Indonesia.

LITERATURE REVIEW

Referring to LAW No. 21 (2008), sharia financing is based on yield (Mudharabah). Financing is based on capital Inclusion (Musyarakah), the principle of buying and selling goods by obtaining profit (Murabaha) or capital goods financing based on the principle of pure rental without choice (Ijarah). Sharia banking is a banking system whose operational activities and products are developed based on Islamic Shariah principles, in particular, to avoid the practice of calculating interest

systems or containing the elements of RIBA. Sharia banking systems are leaning on efforts to implement risk-sharing practices, encouraging entrepreneurship, eliminating speculative attitudes, and prioritizing Akad.

Unlike the concept of conventional bank credit distribution, debt-financing schemes are based on the interest calculation system. Sharia banking financing is based on the Islamic Sharia principle that is PLS or shares risk, which is further developed into equity financing scheme (based on result share system) and debt-like financing (based on markup value). Debt financing is a bank loan recognized as a debt. Borrowers should pay off the debt plus a predetermined interest fee at the beginning within an agreed time. According to Rahim and Ghani (2018) and Chelhi et. al (2017), the financing classified as debt-like is Murabaha and Ijarah. Both uses buy and sell principles, but asset mastery (guarantee) is transferred to the bank (the fund owner) if the individual or perpetrator fails to pay. DEBT financing encourages individuals or actors to pay their financing regularly using their cash flow to avoid falling to pay. In equity financing, banks or fund owners provide financing in the form of inclusion in a company or project with a calculation system for the outcome. The share ratio to the product is increasing to the nominal financing (Ali and Zada, 2019).

Chelhi et. al (2017) found that sharia banks used more debt-like financing schemes to avoid the moral hazard in equity financing. Limited information relating to business activities and debtors and the emergence of monitoring issues make the risks faced by banks greater. Although banks participate in capital participation, sharia banks cannot control and make decisions regarding business activities. Shabsigh et al. (2017) and Aysan et al. (2017) show that sale or lease contracts dominate more in Sharia banking transactions, where the Murabaha and Ijarah methods reached 70% of the total financing, while the PLS scheme was only 5% of the total financing. This argument is reinforced by the research of Akin et al. (2016) that the Sharia banking system is still far from the ideal practice for Sharia outcomes.

The study of the Sharia banking system (Islam) has been done frequently. Kasri (2010) and Ergec and Arslan (2013) indicate that the movement of interest rates still influences sharia financing movements. However, sharia banking is less risky than conventional banking. According to the findings of Abedifar et al. (2013) and Pappas et al. (2016), he used different research methods and populations. Ascarya et al. (2016) found that the Islamic financial system based on the PLS scheme was more resistant to instability or economic crisis than conventional banking based on the interest calculation scheme.

Ibrahim (2017) tested the procyclical relationship between the business cycle and the distribution of loans and financing in the dual banking system in Malaysia. Overall conventional and sharia financing moves procyclical towards the business cycle. When tested deeper, only conventional borrowing is procyclical to the movement of the business cycle. Sharia financing tends to be unaffected by the business cycle conditions. Sharia banking financing in general and Sharia banks (full-pledged) in particular can move counter-cyclical to business cycles. Ascarya et al. (2016) also examined the procyclical movement, which conducts tests on conventional banking and sharia banking in Indonesia. Sharia banking has not fully operated according to Islamic sharia principles in the practice of dual banking systems. Ascarya et al. (2016) tested data on conventional banking and sharia banking months from January 2004 to August 2014 using the method Ordinary Least Square (OLS), Error Correction Model (ECM), and Autoregressive Distributed Lag (ARDL), as well as

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Granger Causality. Ascarya et al. (2016) used first difference real financing as a proxy for Sharia banking financing and industrial production index variables as a business cycle proxy.

Acharya's findings were reinforced by the study of Aysan and Ozturk (2018), who tried to implement the research of Ibrahim (2017). The basic estimation model used is the same as the GMM VAR Estimator Panel with the addition of a bank-specific variable that is liquidity, profitability, and credit quality in addition to the size variable and capitalization of the bank. The study was conducted on conventional banks and Sharia banks located in Turkey. At the national banking level, in Turkey and Malaysia, financing demonstrates the procyclical movement of the Business Cycle Movement (GDP growth). However, when separated between conventional loans and Sharia financing, financing has been shown that sharia financing is not much different from conventional loans. We can conclude that sharia financing could not stabilize the economy. Sharia banks withstand financing as the economy weakens. These results contradict the previous research of Ascarya et al. (2016).

Ibrahim (2017), Bertay et al. (2015), and Brei et al. (2013) found that the bank's size was negatively correlated with the growth of financing distribution; the smaller the bank's size, the higher financing distribution growth. This result is possible because the more substantial the relationship between a small bank and a company or entrepreneur is. Large banks tend to have lower capital ratios and are more exposed to riskier economic activities. Sharia banking with a smaller size will have a lower credit risk (Abedifar et al., 2017). Masood et al. (2011) explained that sharia banks with insufficient assets would be more stable than banks with significant assets. Large banking, as incredible as the asset, will be a more diversified income.

Khan (2010) found that banks with lower liquidity risk were more daring to take risks. Banks with higher deposit ratios have a smaller risk of liquidity. Bank deposits can increase the average risk of assets and liquidity formation; banking will increase the distribution of financing when the composition of deposits is higher (Acharya and Naqvi, 2012). This argument was also strengthened by the research results of Mahdi and Abbes (2017) that increased liquidity tends to encourage banks to choose a riskier portfolio.

Capital can be used as one of the CAMEL components to measure the performance of the bank. Capital reduces the failure of the bank. Banks with higher risk portfolios are likely to have higher capital to anticipate a failed risk (Shim, 2013). High capital banks indicate that high portfolio risk ownership tends to withstand investments (Khan, 2010). Sharia banking performance is determined by the capital owned (Aliyu and Yusof, 2016).

The quality of conventional banking financing is indicated by the financial variable nonperforming loan (NPL). Sharia banking financing is indicated by nonperforming financing (NPF). The NPF suggests the bank's ability to re-collect credit or financing that has been done until the entire obligation is fulfilled. Nevertheless, with the principle of sharia, which is preferred for PLS or profit-loss sharing, the risk of NPF does not tend to limit the performance of financing distribution to clients; this is in line with the research of Shabsigh et al. (2017). Although the NPF tends to be high, sharia banking can still post a profit and maintain liquidity.

Profitability can be the most appropriate indicator to measure a bank's performance. The indicators that are used to measure profitability return on equity (ROE) and return on assets (ROA). ROA to see the bank's ability to gain operating profit, while ROE measures the return rate of the bank's stakeholder investments. This research is focused on distributing the financing related to the business cycle;

hence the more precise financial indicators used are ROA. ROA variables can also demonstrate differences in sharia banking behavior and conventional banking. Unlike conventional banking, sharia banking is principally aimed at developing an equitable distribution of welfare and income, so the excellent value of the bank profit is not the basis for banking decision-making. This research can show whether sharia banking practices in Indonesia are compliant with sharia principles or still more on conventional banking that prioritizes maximizing profits. According to Aliyu et al. (2017), Sharia banking practices are more likely to be profit-driven than socially motivated.

According to Aysan and Ozturk (2018), the business cycle refers to the fluctuations in the aggregate economic activity, consisting of expansion, recession, contraction, and revival. Changes occur repeatedly but are not periodic; business cycle intervals vary, one or ten years or more. Business cycles can also be interpreted as fluctuations in economic activity of long-term growth. There are four phases in the business cycle: The Depression period, in which the aggregate demand declined rapidly, followed by the decline in the output rate and an increase in unemployment to reach the lowest point. The recovery period, a period of increased aggregate demand, followed the output rate increase and the unemployment rate decline. During boom periods, the aggregate demand period can exceed potential GDP (Blanchard, 2017). The period of recession, when the aggregate demand declined, followed a smaller decrease in output than the depression. Each cycle stage has two turning points: peak and trough. Both indicate the cyclical movement of an indicator when the change from the expansion period to the contraction period and vice versa. The indicators commonly used to analyze business or economic cycles are the economic growth or real output and price levels (Tobins, 2019).

Based on previous research, calculating the business cycle can use several indicators in addition to economic growth or real output and price levels. Other indicators that have been used are the industrial production index as used by Ascarya et al. (2016) and the manufacturing production index. Although the Indonesian government seeks to boost the economy by encouraging industrial and manufacturing sectors, the output level, in this case, GDP, is still dominated by consumption levels. The proportion of Sharia banking financing is still dominated by consumption financing compared to investment.

RESEARCH METHODS

The research population used in this research are sharia banks and sharia business units of conventional public banks in Indonesia. Sharia banking refers to the description of Sharia banking LAW, including Sharia Commercial Banks (SCB), Sharia business units (SBU), and sharia-credit banks (BPR). This research will only examine SBU financing behaviors. This research sample data used are 8 SBU of Conventional Bank and 12 SBU of Bank Pembangunan Daerah (BPD). The sampling method is non-probability sampling, where a non-random sample is selected based on convenience or specific criteria (Yang and Banamah, 2014). The data is selected from various banks, which are determined according to their groups to obtain a balanced panel. Balance panels are needed for dynamic analysis as we use PVAR (Greene, 2018). Table 2 shows the name of the bank and the type of bank, and Table 3 shows the types of funding for Shariah Business Units (SBU).

Financing Data is the accumulation of Murabaha receivables, QARDH Receivables, lease receivables, Istishna, Ijarah, and financing for the proceeds. After the accumulated financing has been tested, the GFIN data are grouped according to the Equity-financing scheme financing of the

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yield (GBH) system and the debt-like financing scheme of the value mark-up System (GPIU). Equity-financing Data is the accumulation of Mudharabah financing and financing of the Musyarakah, while debt-like financing is a summation of Murabaha loans, QARDH, lease, Istishna, and Ijarah.

There are several endogenous variables used to describe Sharia banking financing in Indonesia. According to research objectives, the main endogenous variables are real GDP growth as proxies of the business cycle (Blanchard, 2017; Tobins, 2019). Another endogenous variable used in research is the bank's financial ratios and one macroeconomic variable i.e., inflation. Bank size (Lnta) in this research will be described by variable Lnta, where Lnta is obtained from natural logarithm total Asset in period t. The liquidity ratio (LIQ) is used to see a bank's ability to fulfill its obligations to third parties in a short period. The calculation method is as follows (Garrison et. al, 2012):

$$\text{Liquidity} = \frac{Short\text{-}term\ Assets}{Short\text{-}term\ Obligations} \quad \text{.....(1)}$$

Short-term assets and short-term liabilities are calculated as follows: Short-term assets = BI Current Account + Placements with Other Banks + Receivables + Financing + Accompaniment + Income to be Received. Short-term Obligations = Wadiah Savings Funds + Unrelated Investment Funds + Other Immediate Liabilities (PAPSI, 2013; Sharia Banking Statistics, 2022).

Capital (Cap), according to BI regulations (PAPSI, 2013), is also a factor in assessing the soundness of banks to see the adequacy of capital owned by banks to save current period risk exposures and risks that can arise at the start of the day. The capital factor used is total capital divided by total assets. The total capital value is obtained from SCB quarterly financial statements, which are the sum of paid-up capital + capital deposit funds + agio. In accordance with BI regulation, the capital factor is not an appraisal factor for SBU because it is a business branch of conventional banks, where no minimum capital deposit is determined.

The quality or total quality of financing (NPF), this ratio is to measure the quality of distribution of one bank financing, which determines the total financing problems that fall into the category of Substandard, the variety of Attention, and Loss category. The variable used is NPF (loans with net performance) for SCB (Garrison et. al, 2012: 223). OJK regulations and credit quality is calculated from the total CKPN or PPAP that compiles the financial statements, which are then divided by the total financing.

Profitability (REN) assesses the ability of a bank to generate profits for certain reporting periods (PAPSI, 2013 and Garrison et. al, 2012). For most SBU, the value of operating income listed in the SBU balance sheet is the net income before tax listed in the income statement, but several SBU include the accumulated profit in the balance sheet. ROA ratio is obtained by dividing operating profit before tax by total assets (Garrison et. al, 2012). The inflation rate (Inf) measures the rate of change in the price level. The inflation variable used is quarter-to-quarter inflation (qtq) according to real GDP growth (Blanchard, 2017).

In this research, the data testing and analysis employed the panel vector autoregression method. This Panel VAR method can not only show the heterogeneity of banks over a certain period of time and the influence of one variable on other variables but also shows the relationship between the movement of Islamic banking financing with the business cycle and the response of Islamic banking financing if there is a shock on the GrGDP variable (proxy of the business cycle) which will be described using the impulse response function (Abrigo & Love, 2016).

The panel VAR combines the traditional VAR approach, where all

variables in the system are considered endogenous, with a panel data approach that allows the use of unobserved individual heterogeneity (Abrigo & Love, 2016). We use the panel VAR to eliminate the effect of heterogeneity on bank financing behavior. It is permissible to use lag on the variable to be estimated. In this research, we used the lag one to transmit its influence over time.

VAR panel estimation uses STATA 14.0 software with PVAR programming developed by Abrigo and Love (2016). Helmert transformation calibration methods and GMM estimators have been calculated in the PVAR instruction, so the coefficient results obtained in STATA have eliminated the fixed effect. We use the Panel VAR method to show the response of responder variables to the impulse variable shock by using the impulse response function (IRF) and can see the contribution of each independent variable to the dependent variable through variance decomposition analysis. IRF is formed after the coefficient estimation process with the GMM system. This research focuses on orthogonalized IRF, which shows the variable response financing the orthogonal shock of other variables, in this case, the GrGDP variable (proxy of the business cycle). Organizing the response will identify the impact of one variable of shock in the system over some time, while another shock remains constant or shock of 0, which can further identify the response of Islamic finance to the shock of the business cycle separately.

The first step that needs to be done is to do panel unit root testing on the dynamic analysis of panel data. Panel unit root tests are performed to identify the stationarity of each variable in the system. Each variable must be stationary or not have a unit root. There are several unit root test methods for panel data in STATA software: Levin-Lin-Chu, LM Stationarity, Im-Enlargement-Shim, and ADF - Fisher Chi-square; each test requires requirements. In this research, the Fisher's test statistic, ADF - Fisher Chi-square, where Fisher's test is possible for unbalanced panel data (Greene, 2018 and Abrigo & Love, 2016)). The data points out that the bank data used in this research are not the same; not all SCB and SBU have been operating since the first quarter of 2007; besides that, several SBUs do not have publication reports for a certain period.

The stages of analysis up to IRF are the pvarsoc test; this test is carried out to determine the optimal lag or lag to obtain maximum results. Both PVAR estimates use lag obtained from the pvarsoc test results. The pvar estimation using the helmet transformation and GMM estimator is programmed in the Abrigo & Love programming. Third, they test the estimated results' stability using the pvarstable test. The test results will be seen whether the modulus results are less or more than one. Fourth, IRF analysis to see the results of impulse.

The study analyzed four types of transmission models (Mahdi and Abbes, 2017; Weill and Zins, 2021). The first to third models follow the concept of GFIN, GPIU, and GBH transmission through the internal transmission of the company variables CAP (capital), NPF (non-performing financing), LIQ1 (liquidity), and REN (rentability or profitability). The PVAR variables are arranged according to the order of GFIN, CAP, NPF, LIQ1, and REN. Exogenous variables are GrGDP, Bank Assets (ASSETS), and Inflation (INFLATION). We replaced the second and third models of GFIN with GPIU and GBH. Model 4 is the GrGDP model, where the financing variables GFIN, GPIU, and GBH will respond to impulses from GrGDP. Exogenous variables in the PVAR model act as non-dynamic variables, in the sense that exogenous variables act as environmental controls (conditioners) of dynamic variables that are passed in the model.

This paper uses the Panel Vector Autoregression (PVAR) estimation technique. Several recent econometric

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applications have not provided estimates of the PVAR model, so this research uses a programmatic application. Abrigo & Love (2016) proposed the concept of a PVAR estimator, which can be solved using GMM and FGLS. The PVAR method was later developed by Benes (2014) using Matlab to process the interdependence of 3 economies of 3 countries. Abrigo and Love (2016) developed STATA programming for processing PVAR. The estimation results of the two programs have some fundamental differences. STATA programming uses a stacked data structure commonly used in STATA, while Benes (2014) used an unstacked data structure. The parameter estimator in STATA is GMM, while in Matlab, it is FGLS. The output produced by the Matlab program provides more information, such as the decomposition variance value, the IRF value for panel data, or individual data banks. The technical weakness of the Matlab program is that the unstacked data array requires the user to change the program if the number of individuals changes. The authors have conducted an unpublished study from the Deposit Insurance Corporation (LPS) using Matlab by following the Abrigo and Love (2016) procedure.

We begin to develop the PVAR model, where the arrangement of variables is endogenous, in the first equation as the dependent variable, while in the other equation as the independent variable and the lag dependent variable. The structure of the relationship between variables to adopt endogeneity between variables. Each variable can affect other variables directly or indirectly (Greene, 2018 Abrigo & Love, 2016). In equation 2, we say the first equation is the GFIN equation. The GFIN variable acts as a dependent which is influenced by the CAP, NPF, LIQ1, and REN variables. Because the relationship between variables is endogenous, the CAP variable acts as the dependent variable in the CAP equation, which is influenced by the GFIN, NPF, LIQ1, and REN variables. This rule continues until the REN equation. The rules for the arrangement of contents also adopt the Cholesky's orthogonalization method. The equations show the sequential transmission arrangement between GFIN, CAP, NPF, LIQ1, and REN. The order of these variables follows Weill and Zins (2021) and Mahdi and Abbes (2017).

We describe PVAR and VAR in this paper as a data matrix that will help researchers perform IRF and Variance Decomposition analysis. The fundamental difference between PVAR and VAR lies in the data structure that adopts behavior between individuals and dynamic behavior between variables. The PVAR used uses the estimator concept proposed by Abrigo & Love (2016). In the case of a VAR panel, a data set consists of i = 1,2,…., N individuals. Each individual has t= 1,2,3,…, T period. The following is an example of model 1 where the W matrix consists of 5 endogenous variables GFIN, CAP, NPF, LIQ1, and REN. The arrangement of the PVAR(1) equations which consist of 5 equations, is

$$
\begin{aligned}
GFIN_{it} &= \beta_{10} + \beta_{11}GFIN_{it-1} + \beta_{12}CAP_{it-1} + \cdots + \alpha_{16}REN_{it-1} + \varepsilon_{gfin,it} \\
CAP_{it} &= \beta_{20} + \beta_{21}GFIN_{it-1} + \beta_{22}CAP_{it-1} + .. + \alpha_{26}REN_{it-1} + \varepsilon_{cap,it} \\
&\ldots \\
REN_{it} &= \beta_{50} + \beta_{51}GFIN_{it-1} + \beta_{52}CAP_{it-1} + \cdots + \alpha_{56}REN_{it-1} + \varepsilon_{ren,it}
\end{aligned}
\tag{2}
$$

Where $GFIN_{it}$ and $GFIN_{it-1}$ are vector, the dimension is $[T-(m+2)+1]Nx1$.

$$GFIN_{it} = \begin{bmatrix} GFIN_{1,m+2} \\ \dots \\ GFIN_{N,m+2} \\ GFIN_{1,m+3} \\ \dots \\ GFIN_{N,m+3} \\ \dots \\ GFIN_{1,T} \\ GFIN_{N,T} \end{bmatrix}, GFIN_{it-1} = \begin{bmatrix} GFIN_{1,m+1} \\ \dots \\ GFIN_{N,m+1} \\ GFIN_{1,m+2} \\ \dots \\ GFIN_{N,m+2} \\ \dots \\ GFIN_{1,T-1} \\ GFIN_{N,T-1} \end{bmatrix} \quad (3)$$

The variable $GFIN_{it}$ is arranged as a column vector consisting of the first individual to N individuals in the m+1 year, then the column arrangement repeats below it for the first individual to N individuals in the m+3 year and so on the first individual to N individuals in the year m+3 to T. Then the vector has dimensions [T-(m+2) + 1]Nx1. The vector $GFIN_{t-1}$ is arranged in the same way but the data starts from time to m+1 to T-1. The variable m is the desired amount of lag. The other variables CAP_{it} and REN_{it} are arranged in the same way but the data starts from time to m+1 to T-1. The independent variable vectors CAP_{it-1} and REN_{it-1} have dimension [T-(m+2)+1]Nx1.

$$CAP_{it-1} = \begin{bmatrix} CAP_{1,m+1} \\ \dots \\ CAP_{N,m+1} \\ CAP_{1,m+2} \\ \dots \\ CAP_{N,m+2} \\ \dots \\ CAP_{1,T-1} \\ CAP_{N,T-1} \end{bmatrix} \text{ and } REN_{it-1} = \begin{bmatrix} REN_{1,m+1} \\ \dots \\ REN_{N,m+1} \\ REN_{1,m+2} \\ \dots \\ REN_{N,m+2} \\ \dots \\ REN_{1,T-1} \\ REN_{N,T-1} \end{bmatrix} \quad (4)$$

We can see that the dependent variables are arranged sequentially according to the individual, then repeat at different times. The next step we combine all the independent variables in one equation. The matrix to the right of the first (independent) equation is denoted as $W_{GFIN,it-1}$ with dimension [T-(m+2)+1]Nx[T-(m+2)+1]xK. The matrix $W_{GFIN,it-1}$ is a diagonal block consisting of a matrix w. Here $W_{CAP,it-1}$=$W_{LPF,it-1}$= $W_{LIQ,it-1}$=$W_{REN,it-1}$ according to variable name. The matrix format is

$$W = \begin{bmatrix} w_{m+1} & 0 & 0 & 0 & 0 \\ 0 & w_{m+2} & 0 & 0 & 0 \\ 0 & 0 & w_{m+3} & 0 & 0 \\ 0 & 0 & 0 & \dots & \dots \\ 0 & 0 & 0 & \dots & w_T \end{bmatrix} \quad (5)$$

Matrix w_{m+1} and w_{m+2} have Dimension [T-(m+2)+1]xK consists of data lag variables $GFIN_{it}$, CAP_{it}, NPF_{it}, LIQ_{it},and REN_{it}. that is

$$w_{m+1} = \begin{bmatrix} 1 & GFIN_{1,m+1} & CAP_{1,m+1} & \dots & REN_{1,m+1} \\ 1 & GFIN_{2,m+1} & CAP_{2,m+1} & \dots & REN_{2,m+1} \\ 1 & GFIN_{3,m+1} & CAP_{3,m+1} & \dots & REN_{3,m+1} \\ 1 & & & \dots & \\ 1 & & & & \\ 1 & GFIN_{N-1,m+1} & CAP_{N-1,m+1} & \cdots & REN_{N-1,m+1} \\ 1 & GFIN_{N,m+1} & CAP_{N,m+1} & \cdots & REN_{N,m+1} \end{bmatrix}$$

And

$$w_T = \begin{bmatrix} 1 & GFIN_{1,T} & CAP_{1,T} & \dots & REN_{1,T} \\ 1 & GFIN_{2,T} & CAP_{2,T} & \dots & REN_{2,T} \\ 1 & GFIN_{3,T} & CAP_{3,T} & \dots & REN_{3,T} \\ 1 & & & \dots & \\ 1 & & & & \\ 1 & GFIN_{N-1,T} & CAP_{N-1,T} & \cdots & REN_{N-1,T} \\ 1 & GFIN_{N,T} & CAP_{N,T} & \cdots & REN_{N,T} \end{bmatrix} \quad (6)$$

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The next step we combine all the equations into G_{it} matrix. Matrix G_{it} is dependent and G_{it-1}. is independent with dimension [T-(m+2)+1]MxNx1. For 5 variables, where M is the number of variables and N is the number of sections, then the dimensions of the matrix G_{it} and G_{it-1} are [T-(m+2)+1]5Nx[T-(m+2)+1]MxK. The matrix format G_{it-1} is

$$G_{it-1} = \begin{bmatrix} W_{GFIN,it-1} & & \\ & \dots & \\ & & W_{REN,it-1} \end{bmatrix} \quad (7)$$

PVAR is condensed into

$$G_{it} = \beta_0 + \sum_{l=1}^{m+1} \beta_{lt}\, G_{it-l} + \delta X_{it} + \varepsilon_{it} \quad (8)$$

Matrix $X_{it}$is an exogenous variable

$$X_{it} = \begin{bmatrix} GrGDP_t \\ ASSET_{\ it} \\ Inflation_t \end{bmatrix} \quad (9)$$

This sequence follows Weill and Zins (2021) and Mahdi and Abbes (2017). Greene (2008) states that the unbiased estimator for β is:

$$\hat{\beta} = (W'_{it-1}V^{-1}W_{it-1})^{-1}W'_{it-1}V^{-1}Y_{it} = \left(\sum_{i=1}^{n}\sum_{j=1}^{n}\sigma^{ij}W_i'\right)^{-1}\left(W_j\sum_{i=1}^{n}\sum_{j=1}^{n}\sigma^{ij}W_i'Y_j\right) \quad (10)$$

Matrix V is the residual covariance variance matrix between the equations y_{it}, z_{it} and p_{it}. The correlation between time and error matrix becomes:

$$V = E[\varepsilon\varepsilon'] = \begin{bmatrix} \sigma_{yy}I & \sigma_{zy}I & \sigma_{py}I \\ \sigma_{yz}I & \sigma_{zz}I & \sigma_{pz}I \\ \sigma_{yp}I & \sigma_{zp}I & \sigma_{pp}I \end{bmatrix} \quad (11)$$

PVAR is iterated under conditions of stable PVAR parameters. The repeated PVAR model will form 3 parts, namely the average element, the estimated parameter matrix A and pure innovation or in the form of a forecast shock to pay attention to the contemporaneous impact on PVAR (Greene, 2018 and Benes, 2014).

$$G_{it} = \mu + \sum_{j=1}^{\infty} A_1^t e_{it-j} = \mu + \sum_{j=1}^{\infty} \phi_j \varepsilon_{it-j} \quad (12)$$

If the PVAR consists of 2 variables (M=2), and β is the estimated PVAR parameter and α is the contemporaneous parameter matrix parameter, then the IRF form is as follows:

$$\begin{bmatrix} GFIN_{it} \\ REN_{it} \end{bmatrix} = \begin{bmatrix} \overline{GFIN}_{it} \\ \overline{REN}_{it} \end{bmatrix} + \sum_{i=1}^{\infty} \begin{bmatrix} \beta_{11} & \beta_{12} \\ \beta_{21} & \beta_{22} \end{bmatrix}^i \frac{1}{(1-\alpha_{12}\alpha_{21})} \begin{bmatrix} 1 & -\alpha_{12} \\ -\alpha_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{GFIN,it-1} \\ \varepsilon_{REN,it-1} \end{bmatrix} \quad (13)$$

Impulses that coincide as the disturbance occurs and analyze the dynamics that occur after the disturbance occurs for several periods. Contemporaneous impact with Cholesky's orthogonalization structure becomes

$$\frac{1}{(1-\alpha_{12}\alpha_{21})} \begin{bmatrix} 1 & -\alpha_{12} \\ -\alpha_{21} & 1 \end{bmatrix}$$

or become

$$\begin{bmatrix} 1 & 0 \\ -\alpha_{21} & 1 \end{bmatrix} \quad (14)$$

Transmission and order using the Cholesky method will produce two kinds of analysis, namely analysis of responses that occur 1) instantaneously (contemporaneous) and 2) responses that occur in the next period after the impulse occurs. Estimation, determination of maximum lag, and measurement of PVAR stability adopted using the STATA program created by Abrigo and Love (2016).

RESULTS AND DISCUSSION

As explained in the estimation process before, this section discusses the results of the process according to the steps carried out specifically for PVAR analysis. The first stage when the research uses the dynamic model of the VAR method with panel data is as follows. In the first stage, the researcher must ensure the level of stationarity of the panel data using the unit root panel test. The second stage determines the lag in order to obtain the optimum model. The third stage is a stability test to ensure that the PVAR model applied is stable. Stability test using the pvarstable command. The fourth stage is processing the IRF procedure. In the IRF procedure, we use Cholesky decom-position. The fifth stage analyzes the simulation response due to impulses that occur in funding (GFIN, GPIU, and GBH).

The following test results are the first stage, where the researcher ensures the stationarity of the panel data used. The test used is ADF - Fisher Chi-square, where fisher's test is possible for unbalanced panel data (Greene, 2018). The results of testing all stationary variables at a significant level of 1% (Table 4).

The second stage performs a lag selection procedure to determine the optimum PVAR model. In STATA, the Pvarsoc procedure is performed to determine the optimal lag used in VAR panel testing. MBIC as Bayesian information criterion and MQIC as quinn information criterion. Obtained the following results as Table 5.

All models use LIQ, CAP, REN, NPF, GrGDP, LNTA, and INF. Based on the test results in Table 5 and the selection criteria by Greene (2018) and Ekananda (2014), there is a consistency where the smallest MQIC is in one lag and the smallest quinn information criterion (MQIC) in three lags. In this research, the use of lag is limited to one lag; taking into account that the financing movement is quite dynamic from one period to another, bank management does not tend to wait until three lags or, in this case, to make decisions on the distribution of financing based on history nine months ago.

We also measured the stability of the VAR panel (as stage three). We use the STATA procedure to estimate the eigenvalue to ensure the VAR panel is stable. The modulus must be below 1 for each iteration, as stated by Greene (2018). Based on the previous pvar estimation results, the procedure from the pvarstable are obtained as Figure 1.

It can be seen from the Figure 1 that all the modulus value in each iteration is less than 1 in all Model GFIN, GPIU, and GBH separately. The estimation results from the Panel VAR have stability. The modulus value is illustrated in the graph, and each iteration point appears still in a circle. So it can be concluded that the estimation results of the VAR panel system have proven stable in the next stage, namely IRF.

Impulse Response function (IRF) to see the Response of a Variable in the system when there is a shock or change in another Variable. The use of IRF is not only to see the growth of Islamic finance when there is a shock in the business cycle, in this case, the growth of actual GDP but also sometime after the shock. In the IRF simulation, an optional command is added, namely OIRF (orthogonalized IRF); this is intended to show the Response Variable the financing of orthogonal shock (Abrigo & Love, 2016). Another variable, in this case, is the GrGDP Variable (proxy of the business cycle). We orthogonalized the response, which can identify the impact of one shock variable in the system at one time period while the other shock remains constant or shock is 0. We analyze IRF; it is first necessary to estimate the confidence interval (confidence interval). Because the IRF matrix is formed from the coefficient of the estimated VAR results, the standard error needs to be considered (Ekananda, 2014).

The explanation in this section follows the estimation strategy described in the

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research methods section. The analysis uses the impulse measurement results from the bank's internal variables and responds to them. The bank's internal variables are GFIN, LIQ, CAP, REN, and NPF. GrGDP, INFL, and LNTA banks as exogenous variables (Mahdi and Abbes, 2017). Although all variables can function as endogenous, the primary response variable is Islamic finance to meet the research objectives. In contrast, bank variables and macro variables are GrGDP, LNTA, and LIQ. The variable financial growth of financing (GFIN), growth of receivables financing (GPIU), and growth for profit-sharing funding (GBH) become impulse variables in the study. GrGDP, LNTA, LIG, CAP, REN, NPF, and INF variables can be categorized as Variables that directly affect sharia financing and economic growth as external factors of the bank, while other variables are internal factors that determine the performance and soundness of a bank.

Both liquidity (LIQ), capital (CAP), and profitability (REN) have a positive relationship with Islamic financing (Mahdi and Abbes, 2017). Every increase in liquidity, capital, and profitability is responded positively to the distribution of financing marked by the rise in Islamic financing, while Islamic finance responds negatively to every increase in NPF. NPF is an indicator of the quality of Islamic banking financing; the greater the NPF value indicates that the financing rate has decreased, and the quality of fulfillment of customer obligations has been marked by late payment. The increase in NPF does not only reduce the quality of financing but can affect the financial performance of banks because SCB or SBU must make a backup to anticipate defaults that can ultimately affect bank liquidity.

The level of inflation has an indirect relationship to the distribution of funding. Inflation directly affects GrGDP and vice versa; inflation can also influence the customer's business performance, which may affect the ability to pay customers. The inflation rate has an indirect negative relationship to the distribution of financing. An increase in inflation can reduce the actual value of a customer's business. The selling price of goods/services increases, eventually decreasing sales. Finally, the customer's cash flow will be affected. This research supports Mahdi and Abbes (2017).

Even though all Variables affect each other and there is no sequence in conducting the pvar test, when the order of compiling commands in a randomized state will produce the same estimation and Response results, it is possible to determine the transmission and sequence using the Cholesky orthogonalization method. The use of Cholesky can produce two types of analysis: the analysis of Response in the event of a shock and the Response in the next after a shock (Ekananda and Suryanto, 2021).

Figure 1 shows there is a shock on each variable impulse. GFIN or Islamic financing as a Variable Response does not directly respond based on information from one previous period; it takes an interval until the funding distribution finally responds. It appears that when there is a shock in the inflation rate in the next period, GFIN will respond negatively. According to the theory previously explained, where every increase in inflation raises concerns both from the side of the bank and the customer, the customer's business performance may decline, affecting cash flow to the point of being unable to meet obligations. However, the impact of inflation shock is not too significant where it appears that the Response is relatively small at less than 0.03; inflation shock is also not permanent, taking into account the influence of the other variable impulse, in the next period will be corrected gradually to a stable condition.

Figure 2a on the left shows the CAP responding positively to the impulse from GFIN. In the early period, the CAP response increases. Then the CAP response

decreased rapidly until period 5. After period 5 the CAP response fell slowly. Increasing GFIN will increase CAP. Changes will immediately follow the increase in CAP in Liquidity and Assets. Changes in the bank internal will neutralize CAP's response back to its original point in the long term. Figure 2a on the right shows the NPF responding to the negative impulse from GFIN. In the initial period, the NPF response decreased, then the NPF response dropped until there was no different response in period 5. In the following period, the NPF did not experience an additional response. This research supports previous studies by Mahdi and Abbes (2017), and Anggraeni and Berniz (2022). This result follows Anggraeni and Berniz (2022), where the additional funding will ease the capital to provide funds to be distributed to bank customers. Likewise, the quality of financing can be improved due to the addition of total funding (GFIN).

The increase in growth in distribution of financing (GFIN) will reduce the total quality of NPF financing because the management response has not effectively utilized the increase in GFIN in banks. Quality will gradually increase because the distribution of financing will change the liquidity and assets for the better.

Figure 2b on the left shows the liquidity response (LIQ) increasing at the beginning of the period, then decreasing to negative in period 5. Furthermore, this response disappears in the long run. Meanwhile, REN responded negatively as a result of GFIN's shock. At the beginning of the period, REN responded negatively until finally, the response disappeared in period 8. These results follow the transmission described before. As a result of the increase in GFIN, there was an increase in CAP, an increase in LIQ, and then an adjustment in bank profitability (REN).

The research simulates the changes in receivables financing (GPIU) to the bank's internal variables. Researchers want to see the behavior of banks in response to an increase in receivables financing. The increased receivables financing will change the financial structure through the liabilities channel. The increase in debt will indirectly increase capital (CAP) to meet equity obligations.

Figure 3a on the left shows CAP increasing immediately to meet equity obligations and bank capital requirements. The CAP response gradually decreases over a long time. As a result of the increase in debt (GPIU), bank profitability decreased. The picture on the right shows the REN response that fell at the beginning of the period; then the response returned to all positions for a long time. The results support a previous study by Mahdi and Abbes (2017). In the case of Indonesia, Anggraeni and Berniz (2022) also concluded that additional funding (specifically for debt-like financing, GPIU) would immediately ease the capital to provide funds to be distributed to bank customers. Likewise, the quality of financing can be improved due to the addition of debt-like financing, GPIU.

Figure 3b on the left shows the LIQ immediately increasing due to the inflow of funds from debt. All banks showed a downward response adjustment until they returned to all positions in the long run. As a result of increasing debt, profitability will also decrease at the beginning of the period; then, the response will return to its original condition for a long time. This result follows the research of Ergec and Arslan (2013).

Figure 4 shows the response of GFIN, GPIU, and GBH if there is a change in GDP growth (GrGDP). The results support the previous studies by Ascarya et al. (2016) and Ibrahim (2017). When there was an increase in GrGDP at the beginning of the GFIN period, GPIU and GBH showed a positive response, immediately followed by a decrease in sharia financing.

The research simulated changes in profit-sharing financing (GBH). We do not present the GBH model IRF image but complete a table comparing the bank's

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internal financial responses to three types of financing. Table 6 summarizes the bank's internal response variables from different financing. Generally, Capital (CAP) responds to all types of financing with the same pattern. The pattern is positive at the beginning of the period; then, after a long time, the variable response will disappear. The most extended positive CAP response occurred due to GPIU.

Sources of financing from debt cause banks to provide greater capital adequacy. This result is consistent with Ekananda's (2017) research, which states that banks increase capital to respond to increased financial financing.

Total quality of financing (NPF) responds to all types of financing with the same pattern. The pattern is negative at the beginning of the period; after a long time, the variable response will disappear. The fastest negative NPF response occurs because of receivables financing (GPIU). The source of financing from debt causes banks to experience a more significant decline in the quality of financing compared to other sources of financing. However, in the long term, the NPF response is negative for GFIN funding sources and profit-sharing (GBH). This result follows research by Kasri (2010) and Ekananda (2017), which state that the financial quality of shariah banking will improve the financial structure due to the existence of healthy and quality funding sources.

Generally, liquidity (LIQ) responds to all types of financing with the same pattern. The pattern is positive at the beginning of the period; after several long periods, the variable response will disappear. The longest positive CAP response occurred due to GPIU. Sources of financing from debt cause banks to provide greater capital adequacy. This fact follows research by Ergec and Arslan (2013). Profitability (REN) responds to all types of financing with the same pattern. The pattern is negative at the beginning of the period; then, the variable response will disappear after a long period. This result follows the research of Ergec and Arslan (2013).

The last part is an analysis to explain the effect of the business cycle on the distribution of 3 types of Islamic banking financing. The IRF results show the same pattern. The beginning of the period showed a positive response from financing due to increased economic growth. This result follows the research of Ergec and Arslan (2013). Ascarya et al. (2016) also examined the procyclical movement, which conducts tests on conventional banking and sharia banking in Indonesia. Sharia banking has not fully operated according to Islamic sharia principles in the practice of dual banking systems. The policy implications of the Panel VAR analysis include the various policies that can be generated. The implication of the analysis begins with changes in exogenous variables, in this case, changes in financial sources. GFIN, GPIU, and GBH. The source of finance is the debt-like financing (GBH) data which is the sum of Murabaha, qardh, rent, istishna, and ijarah loans. Equity-financing (GPIU) is the accumulation of mudharabah financing and musyarakah financing (Setiawan et. al 2019).

Total financing (GFIN) consists of accumulated debt-like financing (GPIU, value mark-up system) and equity financing (GBH, profit-sharing system). The three types of sources describe the implications of changes in different financial structures. Table 1 shows this financial difference, debt-like financing (GPIU) is nothing but a loan component. At the same time, equity-financing (GBH) is an accumulation of mudharabah financing and musyarakah financing using a profit-sharing system. The summary of the IRF analysis is presented in Table 6. Changes that occur in one of the financing components are responded to by the bank's internal variables in the same direction. Positive changes in financing resulted in a

positive response to CAP, Liquidity (LIQ). PVAR produces the same response for all banks in the study. A positive response indicates that the CAP and LIQ of all banks will increase. Following the IRF assumption, the impulse that occurs will be responded to according to the graph if there is no disturbance during the forecasting observation period. In the first stage, bank management must maintain the company's performance so that there are no policy changes that can disrupt the company's finances; it is expected that CAP and LIQ will continue to increase until the third period.

In the third period, management must carry out the second phase of policy. CAP and LIQ will go down until there is no change. In the event of economic development, CAP and LIQ must be maintained stable and positive results always occur. The consequences of changes in funding can no longer affect. Management increases sources of capital from banks and outside banks.

Positive changes in financing resulted in a negative response to financial quality (NPF) and profitability (REN). Table 6 shows that the decline in NPF and REN immediately fell at the beginning of the period. Thus, bank management must immediately respond to changes with a good marketing strategy and financial diversification. The inflow of funding will reduce the REN and NPF, and if not followed up immediately, it will result in a worse financial balance. In the initial period, banks must prepare marketing strategies and financial diversification. The analysis of economic changes in response to funding is shown at the end of Table 6. The analysis results explain that an increase in economic growth will increase funding. When there is an increase in economic growth, bank profits (REN), and bank financial quality (NPF) decrease, these results indicate a countercyclical phenomenon between the economy and the development of sharia banking. These results are consistent with Ascarya et al. (2016), explaining that conventional banking loans are procyclical to the economic movements, but sharia financing is expected to move countercyclical. When the Indonesian economy declines, it is predicted that sharia banking profits and financial quality will increase. On the other hand, CAP and LIQ must be controlled because they develop down due to a downturn in the economy, which will result in stabilization of the economy occurring.

The latest data showing evidence of countercyclical financing in sharia banking is explained as follows. Figure 5 shows the growth of credit and funding received by banks. The right side is shown as data for December 2021. The growth of Islamic banking funding has remained at 9% to 10% for the last two years. Unlike conventional banking credit, the decline occurred during the last two years. Economic growth at that time decreased.

The two types of funding have different transmission and behavior (Aysan, Disli, and Ozturk, 2017). The three funding groups showed the same positive effect on CAP and LIQ and a negative effect on REN and NPF. The management of sharia banks must maintain a balance of funding so that the decline in Mudharabah (2.52% share) and Musyarakah (46.46% share) must be immediately offset by Murabahah (47.30% share) and Qardh (2.95% share).

Debt-like financing is a bank loan that is recognized as debt. The borrower has an obligation to pay off the debt plus a predetermined interest fee within an agreed time. Debt-like financing ((GPIU)) will encourage individuals or customers to pay regularly using their cash flow to avoid failing to pay (Ali and Zada, 2019). Equity financing ((GBH)) will encourage banks or fund owners to pay (in the form of participation) in a company or project with a profit-sharing calculation system. The profit-sharing system is according to the bank's agreement and the individual/business actor. The profit-sharing ratio is an increasing function of nominal

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financing. The financing risk is greater if the nominal financing is greater (Ali and Zada, 2019). The portion between financing posts between Islamic Commercial Bank (BUS) and Islamic Business Unit (UUS) is almost the same. The same portion shows market developments followed by UUS and BUS in a balanced way (Ali and Zada, 2019).

CONCLUSIONS

Some of the research conclusions are as follows. The Panel VAR model has been appropriately used to analyze the growth of Islamic finance facing the business cycle in Indonesia. Methods The variables used in the research are stationary at the level. The Panel VAR model is stable to produce a convergent impact despite changes in economic growth and Islamic bank financing. The VAR panel was used in the study by considering the heterogeneity of financing of several Islamic Commercial Banks (BUS) and Sharia Business Units (UUS). The dynamics that occur between the variables of economic growth, financing (GFIN, GPIU, and GBH), capital (CAP), quality of financing (NPF), Liquidity (LIQ), and profitability (REN) result in a financing response due to changes in economic growth.

The bank's internal variables, namely CAP and Liquidity, responded positively to changes in the three types of financing. CAP and Liquidity responded positively at the beginning of the period; then, the response gradually disappeared in the next period. The bank's internal variables, namely NPF and REN, negatively responded to changes in the three types of financing. NPF and REN responded negatively at the beginning of the period; then, the response gradually disappeared in the next period.

Islamic banking financing is divided into two methods, namely the receivable or markup value method and the financing or financing method; both financing methods have the same response due to economic shocks. When there is an increase in GDP, Islamic banking will receive more significant financing. In the next period, it will correct the financing that is higher than the decrease; Overall, receivables responded positively to economic shocks. When an event occurs, the decrease in financing receivables will increase. In contrast to profit-sharing financing, which initially increases financing after economic growth increases, then corrects a more profound decline than the previous increase.

Islamic banking financing directly responds to shocks or real GDP growth in the initial period, but the response is lost in the following period. Overall, Islamic banking financing will first respond to positive economic growth. The empirical results show that there is a similarity in the research results by Ascarya et al. (2016) that Islamic financing is expected to move countercyclically. Weill and Zins (2001) found that economic growth declined, and the distribution of financing continued to be encouraged.

As an implication of Islamic banking policies, Figure 4 shows that the increase in economic growth will be responded negatively by GFIN, GPIU, and GBH financing in the next 2 to 3 quarters. Banks can increase income by seeking new sources of funds. An increase in new sources of funds will avoid a lower funding deficit. Ascarya et al., (2016). As with the decline in economic growth, the funds will respond in reverse. Bank management can gain experience progressively 2 to 3 quarters later.

Recommendations can be given as follows. In the first stage, the bank's management must maintain the company's performance so that no policy changes can disrupt the company's finances, and it is expected that the CAP and LIQ will continue to increase until the third period. CAP and LIQ will go down until there is no change. In the event of economic development, CAP and LIQ must be maintained stable and positive developments always occur. The consequences of changes in funding can no longer affect.

The decline in NPF and REN immediately fell at the beginning of the period. Thus, bank management must immediately respond to changes with a good marketing strategy and financial diversification. Debt-like financing ((GPIU)) encourages individuals or actors to pay their financing regularly using their cash flow to avoid default in equity financing ((GBH)), the bank or the owner of the fund provides financing in the form of participation in a company or project with a profit-sharing calculation system following the agreement of the bank and individual/business actors.

The limitations of the research that can be conveyed here include the following. Changes in variables occur only once. The response simulation over time is subject to no disruption or economic change. Changes that occur over time will interfere with the response to other positions. Significant challenges occur in the era of economic change due to the pandemic. This research is expected to be continued with research considering the structural break, switching regression, and threshold value in the VAR model.

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Table 1. Islamic Commercial Bank (BUS) and Islamic Business Unit (UUS) Operations

Indicator (2021)	BUS	UUS	TOTAL	%
I. Profit Sharing Financing	(Billion Rp)	(Billion Rp)	(Billion Rp)	
a. Profit sharing Financing to Non Banks	99 615	98 055	197 670	48.98
1. Mudharabah	3 629	6 556	10 185	2.52
2. Musyarakah	95 986	91 499	187 485	46.46
3. Others	-	-	-	0.00
b. Profit sharing Financing to Other Banks	172	389	562	0.14
1. Mudharabah	164	389	554	0.14
2. Musyarakah	8	-	8	0.00
3. Others	-	-	-	0.00
II. Receivables / Acceptables			-	0.00
a. Receivables from Non Banks	154 581	50 719	205 300	50.87
1. Murabahah	144 180	46 704	190 884	47.30
2. Qardh	10 396	1 524	11 920	2.95
3. Istishna	4	2 492	2 496	0.62
b. Receivables from Other Banks	13	3	16	0.00
1. Murabahah	13	3	16	0.00
2. Qardh	-	-	-	0.00
3. Istishna	-	-	-	0.00
TOTAL (I + II)	254 381	149 166	403 547	100
%	63.04	36.96		

Source: Sharia Banking Statistics, January 2022.
Note: BUS: Islamic Commercial Bank and UUS: Islamic Business Unit

Table 2. Sharia General Unit Data

No	Bank	Type	Label	No	Bank	Type	Label
1	Bank Niaga	SBU	UNIA	11	BPD Kalsel	BPD	UKSEL
2	Danamon	SBU	UDANO	12	BPD DKI	BPD	UDKI
3	BII	SBU	UBII	13	BPD Jatim	BPD	UJTIM
4	Permata	SBU	UPER	14	BPD Riau	BPD	URIA
5	BTN	SBU	UBTN	15	BPD Sumbar	BPD	USBAR
6	Muamalat	SBU	BMUA	16	BPD Sumut	BPD	USMUT
7	Syariah Mandiri	SBU	BSM	17	BPD Sumsel	BPD	UUMSE
8	Mega Syariah	SBU	BMEGS	18	BPD NTB	BPD	UNTB
9	BPD Kaltim	BPD	UKTIM	19	BPD ACEH	BPD	UACEH
10	BPD Kalbar	BPD	UKBAR	20	BPD Jabar	BPD	UJBAR

Data Source: www.ojk.go.id. Sharia Banking Statistics

Table 3. Types of Funding for SBU / BPD

No	Types of Funding	SBU / BPD
1	Murabaha receivables	Murabaha receivables
2	Qardh receivables	*Other Receivable*
3	Rent Receivable	*Other Receivable*
4	Istishna receivables	*Other Receivable*
5	Ijarah	*Other Receivable*
6	Profit Sharing Funding	Mudharabah and Musyarakah Financing

Source: www.ojk.go.id and www.bi.go.id

Table 4. Unit Root Test Results

Variable	Statistic ADF - Fisher Chi-square	P-Val	Variable	Statistic ADF - Fisher Chi-square	P-Val
GFIN	142.334	0.0000	REN	172.289	0.0000
GPIU	143.404	0.0000	LIQ	134.444	0.0000
GBH	232.521	0.0000	CAP	84.0219	0.0001
GrGDP	617.388	0.0000	NPF	57.7710	0.0341
LNTA	74.2448	0.0008	INF	218.537	0.0000

Table 5. Lag Selection for Model Financing (GFIN), Receivables Financing (GPIU), and Profit Sharing Financing (GBH)

Model	No Obs	MBIC	Lag	MQIC	Lag
Model 1 GFIN	820	-357.5209	1	-146.6652	1
Model 2 GPIU	820	-381.1238	1	-170.2681	1
Model 3 GBH	820	-368.2459	1	-157.3902	1
Model 4 GrGDP		-784.0225	1	-244.2319	1

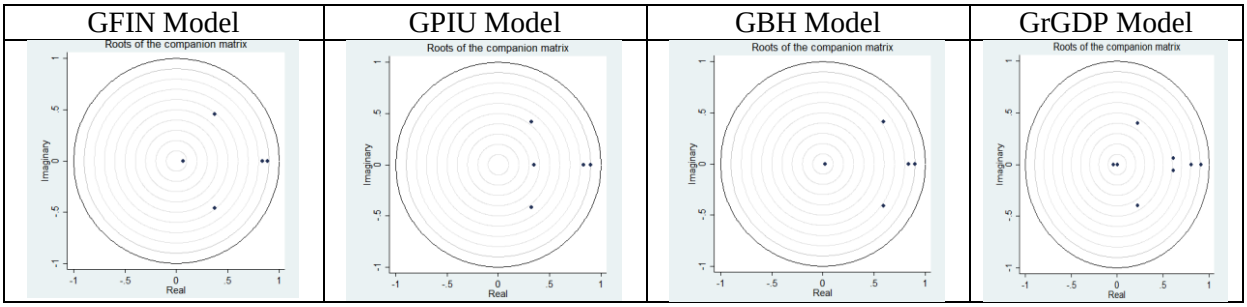

Figure 1. Stability Test

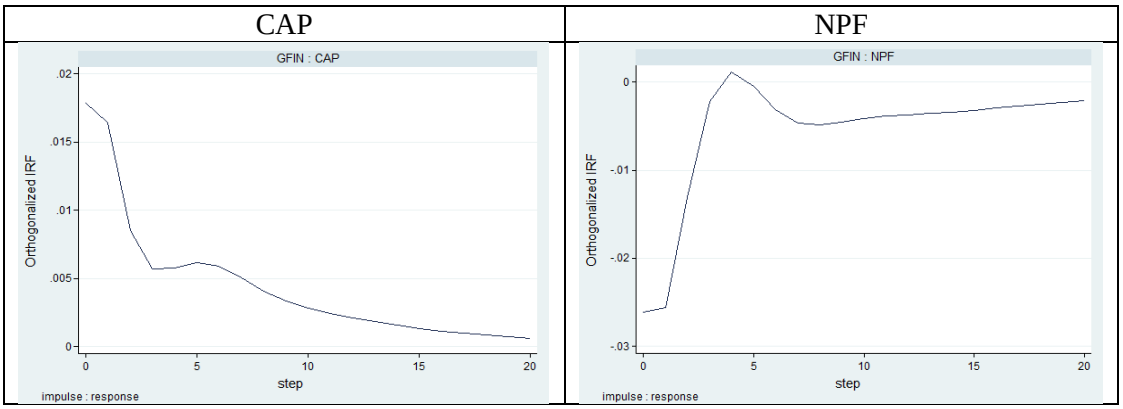

Figure 2a. Response of CAP and NPF to impulse of GFIN

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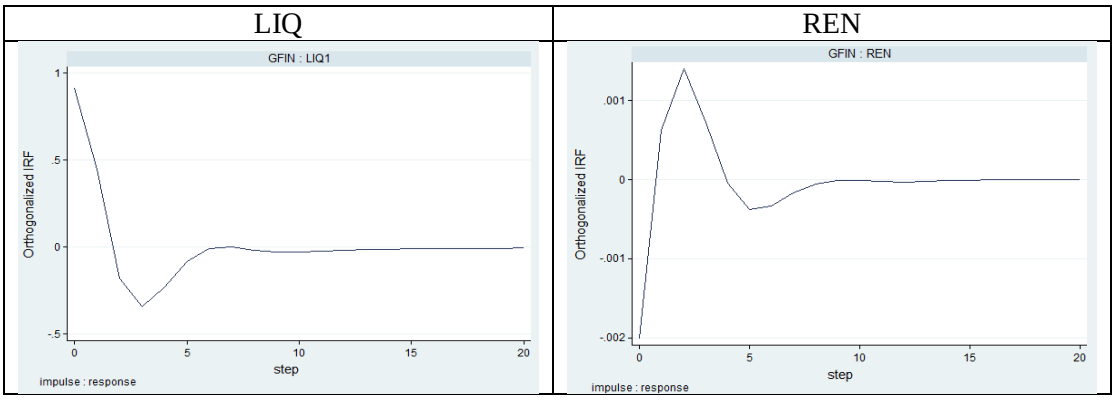

Figure 2b. Response of LIQ and REN to impulse of GFIN

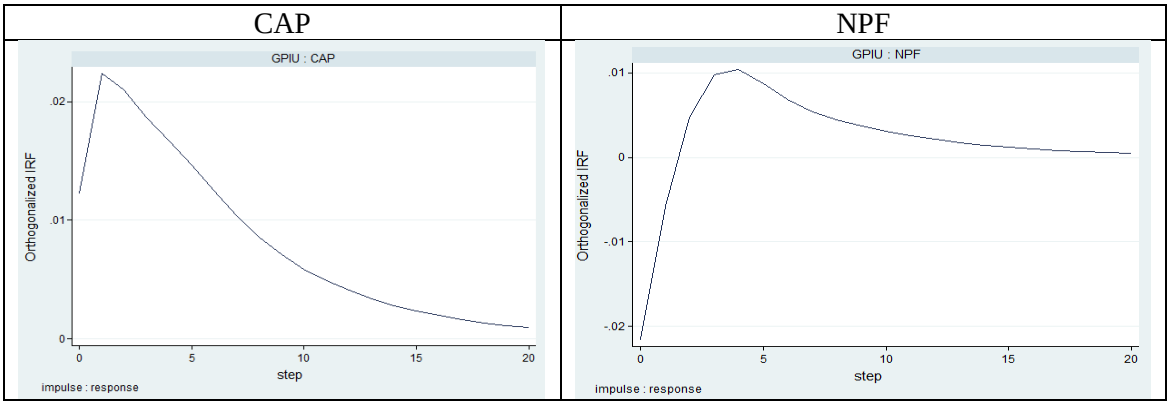

Figure 3a. Response of CAP and NPF to impulse of GFIU

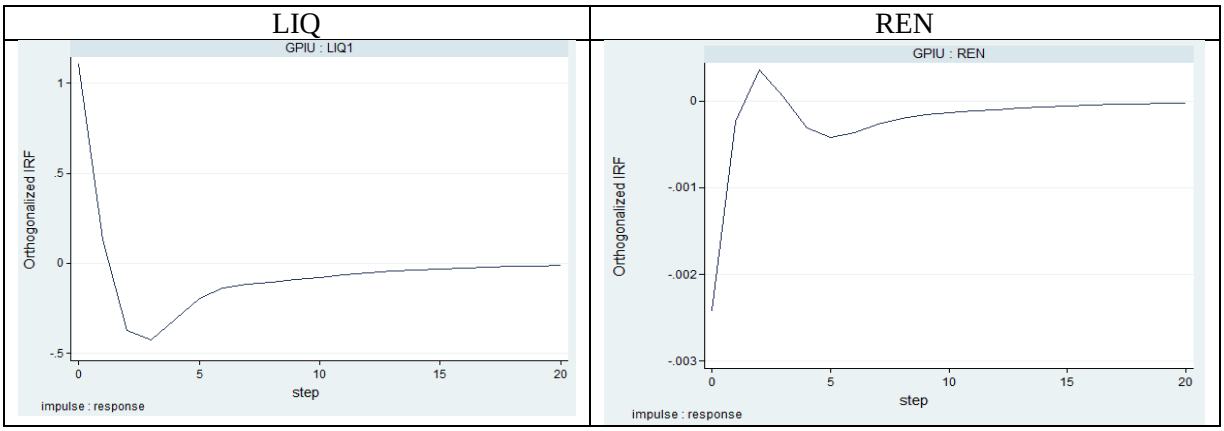

Figure 3b. Response of LIQ and REN to impulse of GPIU

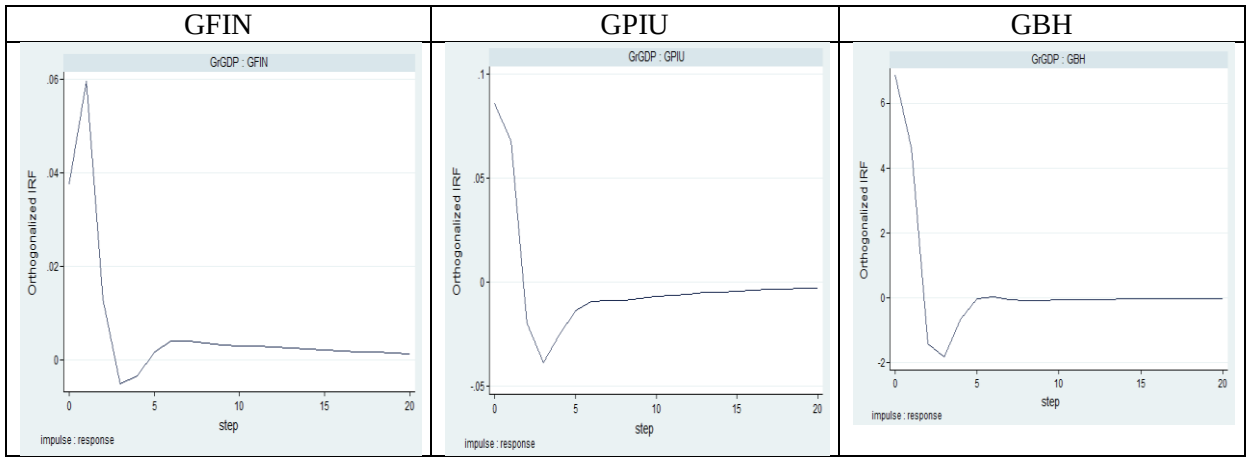

Figure 4. Response of Financial to impulse of GrGDP

Table 6. Summary of Impulses and Responses

Fig	Impulses of	Responses	Remarks
2a	GFIN	CAP_{it}	+++ (0 to 5), +(5 to 20)
3a	GPIU		+++ (0 to 10), + (11 to 20)
	GBH		+++ (0 to 2), - (3 to 9), 0 (10 to 20)
2a	GFIN	NPF_{it}	--- (0 to 5), -(6 to 20)
3a	GPIU		--- (0 to 2), +(3 to 6), 0(7 to 20)
	GBH		--- (0 to 5), -- (6 to 20)
2b	GFIN	LIQ_{it}	+++ (1 to 2), -(3 to 7), 0(8 to 20)
3b	GPIU		+++ (1 to 2), -(3 to 7), 0(8 to 20)
	GBH		+++ (1 to 3), -(4 to 8), 0(8 to 20)
2b	GFIN	REN_{it}	--- (0 to 1), ++(2 to 5), 0(6 to 20)
3b	GPIU		--- (0 to 1), ++(2 to 5), 0(6 to 20)
	GBH		--- (0 to 2), +(3 to 6), 0(7 to 20)
4	GrGDP	GFIN	+++ (0 to 3), -(4 to 5), 0(6 to 20)
		GPIU	+++ (0 to 2), -(3 to 4), 0(5 to 20)
		GBH	+++ (0 to 2), -(3 to 4), 0(5 to 20)

Remark: x(T), x : sign, T : period, 0/+/++/+++ : zero/lower/moderate/highest positive magnitude,

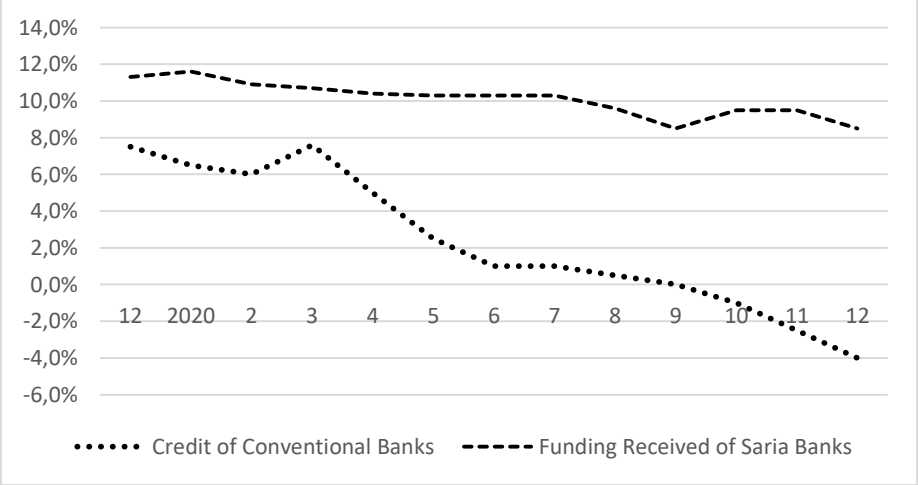

Figure 5. Funding Received and Credit Growth
Sources: The Financial Services Authority (*OJK*) 2021

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