Determinants of credit risk of Indonesian Sharīʿah rural banks

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Abstract

Purpose – This study aims to examine the influence of internal and external factors on the credit risk (represented by nonperforming financing [NPF]) of Indonesian Sharīʿah rural banks (SRBs) – a type of Islamic bank that provides Islamic financial services especially to small and medium businesses in Indonesia. Internal variables comprise capital adequacy ratio (CAR), financing to deposit ratio (FDR), return on assets (ROA), operating expense ratio (OER), financing to value (FTV) and profit and loss sharing (PLS) financing ratio. External variables comprise inflation, economic growth and interest rate.

Design/methodology/approach – The study uses the annual reports of SRBs in Indonesia as secondary data for the years 2010–2019. Auto regressive distributed lag (ARDL) is used as the analysis method to examine the short-run and long-run relationships between the variables.

Findings – The findings indicate that four variables experienced a lag in the short run, namely, NPF, inflation, CAR and PLS, with different results recorded for each of the variables. Furthermore, the long-run results show that CAR and ROA influence the NPF of SRBs positively, whereas inflation and PLS have a negative influence on NPF. The rest of the variables – notably economic growth, interest rate, FDR, FTV and OER – do not have an influence on NPF in SRBs.

Research limitations/implications – The level of NPF in SRBs exceeds the provision of the Central Bank of Indonesia. The findings are expected to have implications for SRBs and the regulator to consider and to manage the factors related to NPF properly due to the important role of SRBs in small and medium businesses' development.

Originality/value – This study measures the determinants of NPF using internal and external variables, including the addition of a dummy variable, notably FTV. This study also uses ARDL to analyze the financial policies involving data at the present time and lagged time.

Keywords ARDL, Credit risk, Internal factors, External factors, Non-performing financing, Sharīʿah rural banks

Paper type Research paper

Introduction

Credit risk, which is often represented by nonperforming loans (NPLs) for conventional banks, is an important component in economic stability. According to Endut *et al.* (2013), NPLs were related to the Asian financial crisis of 2007 and the collapse of financial markets. As a result, NPLs became an important issue and continue to represent a challenge that financial institutions have to manage (Endut *et al.*, 2013). Islamic banks also face the issue of credit risk, in particular, that of nonperforming financing (NPF). According to Al-Wesabi and Ahmad (2013), bad management of credit risk is the cause of failure of three quarters of Islamic banks. One of the reasons is due to limited knowledge about the dynamics of credit risk. Therefore, an adequate understanding of credit risk will lead to a more stable financial system (Adebola *et al.*, 2011).

In Indonesia, credit risk in Islamic banks must be given special attention because the banks face a high level of NPF. Bank Indonesia (the central bank of Indonesia) requires the maximum level of NPL for the banking industry to be 5% (FSA, 2013). However, based on statistics issued by the Financial Services Authority (FSA), the NPF of Sharīʿah rural banks (SRBs) stood at 8.28% as at October 2019. SRBs are Islamic banks which provide services especially to the micro sector. There are 57.89 million business units in Indonesia, and the majority of them (99.9%) are micro, small and medium enterprises (MSMEs) (FSA, 2019). Many MSMEs do not have access to banking services (KNKS, 2019). The existence of SRBs is expected to strengthen the economic activity of the society, especially in rural areas where MSMEs face many difficulties in accessing business capital (Amelia and Fauziah, 2017). The FSA of Indonesia (2019) released the financing distribution and NPF ratio of SRBs.

The data show that the trend of total financing from 2010 to 2019 has increased and that this has been accompanied by an increase in NPF. The NPF of SRBs varied over the period 2010–2019, but all data show that NPF has been above 5%, which means that it exceeded the requirements of Bank Indonesia. However, from mid-2018 to the end of 2019, NPF appears to be under control. The trend of NPF in SRBs certainly raises the question of the extent to which these banks manage their financing risks.

NPL and NPF can be affected by several factors, both internal and external. Previous studies enumerated the internal factors influencing credit risk in the banking industry, specifically NPLs, such as financial ratio and bank characteristics (Suryanto, 2015; Effendi *et al.*, 2017) and external factors such as interest rate, inflation rate and gross domestic product (GDP) (Adebola *et al.*, 2011; Endut *et al.*, 2013; Widarjono and Rudatin, 2021). Many studies also examined the internal and external factors influencing NPF, with varying results among studies (Firmansyah, 2014; Havidz and Setiawan, 2015; Supriani and Sudarsono, 2018).

The objective of this study is to analyze the internal and external factors that influence the credit risk of SRBs in Indonesia. Internal factors used in this study are capital adequacy ratio (CAR), financing to deposit ratio (FDR), return on assets (ROA), operating expense ratio (OER), financing to value (FTV) and profit and loss sharing (PLS) financing ratio. Meanwhile, the external factors consist of inflation, economic growth and interest rate.

The study of credit risk in the banking industry is important for the following reasons. First, credit risk is one of the criteria used to measure the financial performance of banks. Thus, high levels of NPLs at banks will have a negative impact on the banks' income and the sustainability of their businesses (Haniifah, 2015). Second, high NPL ratios not only affect individual banks but also have an impact on the economic stability of a country. According to Rahman *et al.* (2017), bad management of NPLs "will lead to banking failure and countrywide financial vulnerability" (p. 181).

The study can be divided into several sections: the second section discusses the literature review on SRBs and credit risk; the third section presents the research methodology; the fourth section presents the data analysis and the findings; and finally, the fifth section concludes the paper and discusses the implications of the study.

Literature review

Sharī̄ ah rural banks

In Indonesia, most of the poor households and MSMEs are not covered by banking services and do not avail of formal lending practices. Some of the poorer households use shadow banks that charge much higher interest rates. Therefore, the presence of SRBs which provide financing to micro businesses can be a solution to the limited funds available to the small and medium enterprise (SME) sector. According to Widarjono *et al.* (2020), SRBs focus on the financing of SMEs, and therefore, they are important financial intermediaries in Indonesia's economic sector.

There are 165 SRBs in Indonesia, spread over 23 provinces (out of a total of 34 provinces), encompassing both rural areas and cities (KNKS, 2019). The aim is for SRBs to be closer to potential customers to better meet their needs. Furthermore, KNKS (2019) states that SRBs are expected not only to provide financing but also to empower small communities to improve their standard of living.

Nonetheless, according to Nugrohowati and Bimo (2019), SRBs face major challenges, among others, a high level of competition and the need to control risks, especially credit risk. Competition between SRBs and Islamic commercial banks occurs because the government requires the latter to also provide financing to MSMEs. Because of this competition, SRBs may be motivated to simplify the financing procedures, which if not monitored carefully, can increase the risk of bad financing (Nugrohowati and Bimo, 2019). Still, SRBs should be aware of the high percentage of NPF among SMEs. According to KNKS (2019), the financing distributed by SRBs amounted to IDR4.55tn (US$325m) for SMEs and IDR5.52tn (US$394m) for non-SMEs as at September 2019; and the NPF of SMEs has been significantly higher than the NPF of non-SMEs over the recent period, according to data published by FSA (2019).

SRBs, in particular, need to give attention to this phenomenon and try to solve the problem because their focus is on the provision of financing to SMEs. If SRBs cannot manage their levels of NPF, it will have an impact on their financial performance. SRBs, having a market share in the micro sector, tend to be vulnerable to changes in the business world (Firmansyah, 2014).

Credit risk

Risk is defined as "the likelihood of loss" (Megginson, 1997 cited in Elgari, 2003). Credit risk is the most important risk faced by a bank in its operations (Elgari, 2003). Credit risk is "the loss of income arising as a result of the counterparty's delay in payment on time or in full as contractually agreed" (Ahmed and Khan, 2007, p. 144). Credit risk can arise in Islamic banks that channel financing to customers in the form of profit sharing (*muḍārabah*), PLS (*mushārakah*) and *murābaḥah* (cost plus markup). Islamic banks face credit risk in *muḍārabah* and *mushārakah* financing under the profit sharing principles in the form of deferred payments of unpaid profits by the entrepreneur, whereas credit risk in *murābaḥah* contracts arises in the form of the failure of customers to repay financing in full and on time (Ahmed and Khan, 2007). Trinugroho *et al.* (2021) state that Islamic banks may have higher credit risk because of the moral hazard aspect in PLS contracts.

NPF represents a tool to measure financing risks. Banking performance can be evaluated by measuring the level of NPF/NPLs to indicate liquidity, profitability and solvability ratios (Dwihandayani, 2016). Isaev and Masih (2017) argue that NPF plays a key role in determining the quality and performance of banks because financing is the main function of banks in contributing to economic development. Islamic banks need to specifically manage their NPF level because it will have an impact on their performance in competing with conventional banks (Nugraheni and Muhammad, 2019).

There are many factors influencing NPLs or NPF. Endut *et al.* (2013) examined NPLs in 12 countries in the Asia Pacific region during 2000–2008; the results reveal that the performance of macroeconomic variables (inflation, interest rate and GDP) has implications on NPLs. The study shows that macroeconomic stability and positive economic growth will reduce NPLs. Meanwhile, poor macroeconomic implications and higher capital costs will increase NPLs. Poor repayment performance will also trigger higher cost and thus higher financing payments, which in turn will lead to an increasing rate of NPLs.

A similar finding by Damanhur *et al.* (2017) is that increased production of goods and services as an indicator of good economic growth would reduce financing problems. Adebola *et al.* (2011) explain the long-term negative relationship between NPF and interest rate. In a period of high interest rates, the equivalent rate charged to seekers of Islamic financing will increase, as Islamic banks usually refer to the interest rate to determine their financing rates (Hasna *et al.*, 2019). A high equivalent rate will reduce the intention of customers to apply for financing. Consequently, the number of customers who receive financing will be less. This can reduce the volume of financing and the level of financing risk so that the NPF level will also have the potential to decrease.

Studies about NPLs/NPF in different country scenarios have also been undertaken. Haniifah (2015), for instance, examined NPLs in 25 commercial banks in Uganda during 2000–2013. The author analysed four variables (exchange rate, inflation, growth of the economy and interest rate) by linear regression. In line with the above studies which considered the effect of macroeconomic variables on NPF, the results show that inflation, exchange rate and economic growth have a significant negative effect. Adebola *et al.* (2011) studied NPF at Bank Islam Malaysia by using the autoregressive distributive lag (ARDL) approach over the period January 2007–December 2009. The result shows an insignificant effect between the industrial production index and NPF, whereas the interest rate is found to positively influence NPF in the long run.

In the context of Indonesia, Damanhur *et al.* (2017) studied the determinant of NPF in branches of Sharīʿah regional banks in Aceh and found that inflation and total assets influence NPF, whereas FDR has no significant effects on those banks. Supriani and Sudarsono (2018) also studied the influence of micro and macro variables on NPF in the context of Islamic banking in Indonesia. The study found that CAR, FDR and OER have a positive influence on NPF, whereas ROA, rate of Bank Indonesia (BI rate) and exchange rate do not influence NPF in the long term. In the short term, different results were found, notably that FDR, ROA, OER and BI rate have a positive effect on NPF, whereas exchange rate and inflation have a negative influence on NPF. Soekapdjo *et al.* (2018) further studied the influence of macro and micro variables on the bad debt of Indonesian Islamic banks. The study found that OER, exchange rate and GDP have a positive influence; inflation has a negative influence, whereas FDR and CAR do not influence NPF in Indonesian Islamic banks. Widarjono and Rudatin (2021), who examined NPF in Indonesian commercial Islamic banks and Islamic business units, found that operating efficiency and financing diversification had a positive effect, inflation had a negative effect, and CAR had no effect on NPF.

A few researchers have conducted studies of NPF in SRBs in Indonesia. Firmansyah (2014), for instance, found that inflation and GDP have a negative influence, efficiency and size of bank have no influence, and FDR has a positive influence on NPF over the period 2010–2012. Using a sample of SRBs in Indonesia for the years 2012–2017, Nugrohowati and Bimo (2019) found that ROA and CAR negatively influence NPF, whereas inflation has no effect on NPF in SRBs. Meanwhile, Muhammad et al. (2020) found that CAR, ROA and bank size negatively influence NPF in SRBs.

The results of the above-mentioned studies indicate that NPF and NPLs are influenced by micro and macroeconomic factors and by internal and external characteristics of companies. Although these studies reflect different results, in general, these variables tend to have an influence on NPF.

This study will examine the determinants of NPF using internal and external variables. The added value of this study is the addition of the dummy variable, FTV. Islamic banks can use FTV to determine the ratio policy of providing property financing. FTV is useful to maintain the bank prudence level when disbursing mortgage financing because it can increase the risk exposure if SRBs do not implement adequate prudential principles. Another value of this research is the use of ARDL to analyze the financial policies of SRBs, using data at the present time and lagged time. SRBs are very important for the Indonesian economy to distribute financing to SMEs; therefore, assessment of their financial performance is expected to encourage better management of the banks.

Inflation and nonperforming financing

Inflation is "the sustained increase in the general prices of goods and services in an economy over time" (Haniifah, 2015, p. 142). If income does not increase accordingly, inflation is expected to weaken debtors' ability to pay their installments, which will lead to an increase in the NPLs of a bank. However, previous research conducted by Endut et al. (2013), Firmansyah (2014), and Supriani and Sudarsono (2018) show that inflation has a significant negative effect on NPF, whereas Haniifah (2015) found that inflation has a negative but insignificant influence on NPF.

An increase in inflation may result in a decrease in bank income or profits, so that banks reduce their financing expansion when inflation occurs. The decline in financing growth will in turn lower the NPF level of Islamic banks.

Economic growth and nonperforming financing

Economic growth refers to the process of development of economic activities that causes goods and services to be produced in the society and an increase in the wealth of the people (Sukirno, 2013). Bank loans are the main source of business financing and are expected to drive economic growth (Firmansyah, 2014). Measurement of economic growth can use GDP. High economic growth may encourage banks to expand their financing. However, banks must be careful in selecting the right recipients. Banks' lack of caution in giving financing can result in high NPF. If NPF cannot be managed it will have a negative impact on profits. Therefore, high economic growth tends to lead to an increase in NPF because of very large funding distribution. Sukmana (2015) and Effendi et al. (2017) find that increased GDP has a significant positive effect on NPF.

Interest rate and nonperforming financing

Interest in daily banking activities can be divided into two types: interest on deposits and interest on loans. Deposit interest is interest given as a stimulus or remuneration to depositors of a bank. It is the price the bank must pay to its customers within the

conventional banking set-up. Interest on loans is the interest or the price that must be paid by customers for the loans they borrow from the bank. Interest on loans and deposits is the main income and expense for the bank, respectively.

Distribution of funds in the form of loans is the greatest contributor to a bank's income, whereas interest costs of third party funds comprise the largest cost borne by the bank. Interest on loans and interest on deposits have a close relationship. An increase in deposit rates will affect the lending rates as well. An increase in the lending rate will necessitate higher repayments by borrowers to the bank; consequently, this can increase NPF (Sukmana, 2015). The central bank of Indonesia's rate (BI rate) is a proxy for the interest rate that becomes a reference for determining interest rates on loans and deposits. Endut *et al.* (2013) and Sukmana (2015) find that interest rate positively influences NPL in the Asia Pacific region.

Capital adequacy ratio and nonperforming financing
CAR is the main ratio in assessing the capital adequacy of banks. It is a useful instrument in managing the risk of loss of earning assets, especially those originating from credit risk (Sukmana, 2015). Higher CAR encourages banks to distribute more financing, and therefore the trend of NPF will be higher. Supriani and Sudarsono (2018) found that CAR has a positive effect on NPF in the long term.

Financing to deposits ratio and nonperforming financing
Availability of liquidity enables a bank to fulfill its financial obligations, both in terms of fulfilling the demand for withdrawal of funds and commitment to give financing. Comparison between funds given to customers in the form of financing with funds collected from the public is reflected in the FDR. Funds collected include public deposits in the form of savings and various other types of deposits. The type of financing provided is divided into equity financing and debt financing.

A high FDR may lead to a higher level of NPF. Firmansyah (2014) and Suryanto (2015) confirm that FDR has a significantly positive relationship with NPLs in regional development banks in Indonesia. Suryanto (2015) especially states that a high FDR without good management increases the credit problem in financing.

Return on assets and nonperforming financing
The ROA ratio reflects the level of effectiveness of SRBs in managing their assets; a higher ROA indicates a better performance by a bank. According to Ozili (2019), there is an association between ROA and NPLs. A high ROA shows that the financing by Islamic banks can provide benefits. A high profit indicates a low NPF level because almost all bank assets are in the form of financing, meaning that the largest part of a bank's income comes from financing. If the financing provided to customers is less problematic, then this will increase the income and profitability of the bank. Nugrohowati and Bimo (2019) found that ROA negatively influences the NPF of SRBs in Indonesia.

Operating expense ratio and nonperforming financing
OER compares operating costs and operating income (Dendawijaya, 2011). This ratio measures the efficiency in an organization's performance. A smaller OER indicates that banks are more efficient in managing operational costs. A high OER which is caused by high operating expenses will, on the other hand, disturb the operations of Islamic banks and result in a high NPF (Effendi *et al.*, 2017). Effendi *et al.* (2017) found that OER positively

affects NPF in Islamic banks in Indonesia. Suryanto (2015) who studied the relationship between OER and NPLs in regional development banks in Indonesia also found a positive effect between these two variables.

Financing to value and nonperforming financing
FTV or loan to value (LTV) is the maximum financing provided by a bank based on the percentage of the collateral value. FTV assesses the lending risk that banks calculate before approving the financing amount. One of the factors affecting FTV is down payment (DP). A large DP will reduce the amount of the installment and interest payments of the customer. In addition, a longer tenure or credit period given to the customer means that the customer will have to make smaller regular installments. According to Sutanto (2012), the requirement for a high DP will reduce the demand for financing. Moreover, a high cost of borrowing will result in a lower number of loan applications, and this is expected to reduce NPLs/NPF (Wu *et al.*, 2003).

Bank Indonesia issued its LTV policy concerning credit and DP for property in September 2013. The policy is regulated through the external circular of Bank Indonesia No. 15/40/DKMP BI (2013) concerning "Application of Risk Management to Banks That Provide Property Ownership Loans or Financing, Property-Backed Credit or Financing Loans and Motor Vehicle Loans or Financing". The aim of this policy is to enhance the aspect of banks' prudence in property financing. The growth of property prices is feared to be a trigger for financial instability as a result of the default of customers who use banking services to finance their property purchases. Therefore, this policy may have an impact on the NPF level of banks.

Profit and loss sharing and nonperforming financing
Based on the Islamic banking statistics of 2017, the main patterns of financing that dominate Islamic banks are the principles of profit sharing and of buying and selling. For profit sharing principles, the most widely used financing modes are *mushārakah* and *muḍārabah* (Muhammad, 2019). Profit sharing reflects the commitment of Islamic banks in developing Sharīʿah-compliant finance. However, financing based on profit sharing has higher risks compared to financing involving buying and selling because the income of the bank is not fixed as it depends on the profit generated by the customers' businesses. Therefore, Effendi *et al.* (2017) state that PLS financing has a negative influence on NPF.

Research methodology
The study uses annual reports as secondary data of SRBs in Indonesia for the years 2010–2019. The annual reports were accessed from the banks' websites. The study uses the analysis method of auto regressive distributed lag (ARDL). In the ARDL method, variables with different integration orders (level and first difference) can be used. The ARDL method can also assign the direction of the causality of the variables used in the model. One of the advantages of using ARDL is that this model can estimate the short-run and long-run effects of the variables simultaneously (Sukmana and Setianto, 2018).

Data analyses of this study include descriptive statistics, unit root test (using Augmented Dickey-Fuller (ADF) test and Philips-Perron (PP) test), model estimation in the short-run and long-run, lag determination, cointegration test, diagnostic test and stability test. The ARDL model of this study is as follows:

$$NPF_t = \delta_0 + \Sigma\delta_{1i}INF_{t-1} + \Sigma\delta_{2i}GDP_{t-1} + \Sigma\delta_{3i}IRATE_{t-1} + \Sigma\delta_4CAR_{t-1} + \Sigma\delta_5FDR_{t-1}$$

$$+ \Sigma\delta_6ROA_{t-1} + \Sigma\delta_7OER_{t-1} + \Sigma\delta_8FTV_{t-1} + \Sigma\delta_9PLS_{t-1} + \beta_1INF_{t-1}$$

$$+ \beta_2GDP_{t-1} + \beta_3IRATE_{t-1} + \beta_4CAR_{t-1} + \beta_5FDR_{t-1} + \beta_6ROA_{t-1}$$

$$+ \beta_7OER_{t-1} + \beta_8FTV_{t-1} + \beta_9PLS_{t-1} + e_t$$

where:
NPF = Nonperforming financing (per cent);
INF = Inflation using Consumer Price Index (CPI) (per cent);
GDP = Economic growth using Industrial Production Index (IPI) (per cent);
IRate = Interest rate (per cent);
CAR = Capital adequacy ratio (per cent);
FDR = Financing deposits ratio (per cent);
ROA = Return on assets (per cent);
OER = Operating expense ratio (per cent);
FTV = Financing to value (dummy), where 0 = before the policy and 1 = after the policy;
PLS = Profit and loss sharing financing ratio (per cent); and
e = Error term.

Results and discussion

The sample in this research consists of SRBs which are studied over the period January 2010–September 2019. There were 165 SRBs in Indonesia in 2019. Based on the availability of data, this study analyses 164 SRBs (99.4%) using monthly data. The results of the descriptive statistics are described in Table 1.

Table 1 shows that NPF has an average value of 8.59, standard deviation is 1.57, maximum value is 11.80 and minimum value is 6.15. The value of NPF in SRBs is found to be high during the observation period. Even the minimum value of NPF exceeded the expected limit of 5% instituted under Bank Indonesia's NPF policy.

According to the findings, the NPF level fluctuated during 2010–2019. The highest NPF is 11.80 as at Q2–2018, and the lowest NPF is 6.15 as at Q1–2013. These high NPFs should be managed properly so as not to decrease the profits obtained by the bank.

Stationary testing is carried out to determine which data is integrated in the same or different orders. The results of stationary testing show that there are several variables at the stationary level, whereas other variables are stationary at the first difference level or not

Variables	Minimum	Maximum	Mean	SD
NPF	6.15	11.8	8.5988	1.57791
INF	88.79	138.75	1.15E + 02	15.43855
GDP	92.32	154.02	1.23E + 02	15.93085
IRate	4.25	7.75	6.1944	1.02717
CAR	18.81	33.25	23.1687	3.08398
FDR	109.34	139.96	1.24E + 02	7.30467
ROA	1.73	3.97	2.6105	0.42704
OER	75.2	91.89	83.5004	4.88657
PLS	10.83	14.81	12.6444	1.14091

Source: Authors' own

Table 1.
Results of descriptive statistics

integrated in the same order. The stationary test uses an Augmented Dickey–Fuller (ADF) test and Philips–Perron (PP) test.

Table 2 shows that NPF, INF, GDP, IRate, FDR, OER and FTV have ADF probability value greater than the alpha value of 10%. It means that the data is not stationary at the level. Furthermore, the stationary test for the first difference was carried out, and the results showed that the ADF probability values for all variables were smaller than the alpha value of 1%, which indicates that the data are stationary in the first difference. Meanwhile the PP test at the level shows that NPF, INF, IRate, ROA, OER, FTV and PLS values are greater than the alpha value of 10%, meaning that the data are not stationary at the level. The PP test on the first difference shows that all variables are stationary at the alpha value of 1%.

The results of stationarity testing show that there is no integration between the variables so that the selection of the ARDL method is the right method for examining the relationship between NPF and macro-microeconomic conditions that affect SRBs.

In the ARDL regression, an estimation of the relationship between the dependent and independent variables is carried out. Based on the estimation results, an error correction mechanism (ECM) regression is carried out to balance the short-term economic relations with variables that have a long-term balance or economic relationship. The estimation results for the short run are described in Table 3, whereas Table 4 presents the long-run results.

Table 3 shows that the NPF variable in lag 1 negatively affects the following month's NPF. This means that every 1% increase in NPF in the previous month will decrease the NPF of the current month by 0.24% at 1% significance level. This indicates that the NPF decrease is contributed by the previous month's NPF.

Inflation negatively influences NPF in the short run at a 1% significance level. It means that an increase in inflation of 1% will reduce NPF by 0.24%. This implies that higher inflation rates will result in lower NPF. The result is consistent with the study by Effendi *et al.* (2017) and Supriani and Sudarsono (2018). High prices of goods and services because of inflation may reduce the intention of the society to save. Therefore, Islamic banks may have lower third party funds and will thus be more careful in giving out financing (Widiastuty, 2017); consequently, Islamic banks will have lower NPF too.

Otherwise, INF(−1) and INF(−3) had a significant positive effect at the 1% and 5% significance levels. If there is a 1% increase in inflation, NPF will increase by 0.35% in the first month and 0.30% in the third month. The positive effect is in line with the theory that when there is inflation, the high prices of goods will reduce people's purchasing power if

Variables	ADF		PP	
	Level	First difference	Level	First difference
NPF	−1.749311	−12.42104***	−2.369885	−12.95242***
INF	−1.054095	−9.850579***	−1.829982	−7.133381***
GDP	0.554129	−7.680117***	−11.12324***	−54.57975***
IRate	−1.309887	−7.187220***	−1.743521	−7.304156***
CAR	−3.053515**	−16.43171***	−4.300390***	−23.52130***
FDR	−2.456795	−6.493852***	−3.903073**	−7.935367***
ROA	−2.665797*	−9.643522***	−2.841609	−13.04410***
OER	−1.475434	−11.63488***	−2.246113	−17.40983***
FTV	−1.429996	−10.67708***	−1.645499	−10.66632***
PLS	−3.90641***	−6.566503***	−1.766455	−6.015062***

Table 2.
Results of stationary test

Notes: The significant values at the level of 1, 5 and 10% are indicated by ***, ** and * respectively
Source: Authors' own

| | ECM regression | |
| | Case 2: restricted constant and no trend | |
Variables	Coefficient	Prob.
D(NPF(−1))	−0.247377	0.0126***
D(INF)	−0.245595	0.0015***
D(INF(−1))	0.352704	0.0002***
D(INF(−2))	−0.150658	0.1081
D(INF(−3))	0.305944	0.0002**
D(CAR)	−0.003615	0.9362
D(CAR(−1))	−0.117786	0.0224**
D(CAR(−2))	−0.096642	0.0433**
D(CAR(−3))	−0.118587	0.0064***
D(PLS)	0.378112	0.0303**
D(PLS(−1))	−0.696637	0.0001***
CointEq(−1)*	−0.124078	0.0003***

Notes: $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source: Authors' own

Table 3.
Estimation of short-run dynamics

| | Levels equation | | | |
| | Case 2: restricted constant and no trend | | | |
Variables	Coefficient	Std. error	t-statistic	Prob.
INF	0.057	0.076379	0.74628	0.4574
GDP	−0.02315	0.054837	−0.422166	0.6739
IRATE	−1.523375	0.570355	−2.670927	0.0090***
CAR	0.519735	0.253498	2.050255	0.0432**
FDR	0.142077	0.100986	1.406899	0.1629
ROA	0.506846	0.200404	2.529125	0.0132***
OER	1.192526	1.135359	1.050352	0.2963
FTV	−0.325318	0.318194	−1.022387	0.3093
PLS	−55.36658	22.4885	−2.461996	0.0157***
C	0.057	0.076379	0.74628	0.4574

Notes: $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source: Authors' own

Table 4.
Results of estimation
of long-term
coefficient

their income is constant and affect the ability of customers to pay off their financing. Widarjono and Rudatin (2021) explain that inflation can worsen economic conditions by decreasing the purchasing power of consumers, therefore increasing "poor" financing.

CAR does not have an effect on NPF in the short run. This means that the size of the capital owned by Islamic banks does not affect NPF. Capital owned by banks is not always channeled in the form of financing or to cover losses resulting from financing risks. Banks may instead use the capital to invest (Suryanto, 2015). This study supports the results obtained by Havidz and Setiawan (2015) and Suryanto (2015).

However, different results can be observed for CAR(−1), CAR(−2) and CAR(−3) that show a significant negative effect on NPF. This means that if there is an increase in CAR by 1%, it will reduce NPF by 0.117% in the first month, 0.096% in the second month and 0.118% in the third month. A higher CAR means that SRBs have to maintain a larger

amount of reserve funds, thus limiting their ability to provide financing in the long term and minimizing their credit risk as well. This result supports the finding of Muhammad *et al.* (2020) that high CAR can be used to absorb losses and thus minimize financing risk.

PLS has a significant positive effect on NPF in the short run. According to Ozili (2017), the more involved the banking industry is in its role as a financial intermediary, the higher will the risk of NPLs be. The positive relationship between NPF and PLS indicates that SRBs are not successfully mitigating the risk of PLS financing as doing so may involve large monitoring costs. This raises the issue of instability of the Islamic banking system (Fatoni and Sidiq, 2019).

In addition, with a coefficient of 0.696%, PLS(−1) has a significant negative effect. With monthly data, PLS(−1) is interpreted as the lag of the PLS variable in the first month. This means that an increase in PLS financing at lag 1 (in the previous month) will reduce NPF in the current month by 0.696% at the 1% significance level.

The use of the cointegration analysis method aims to analyze the long-term relationship between the explanatory variables and the dependent variable, especially in models containing non-stationary variables. This study uses the cointegration test method from Pesaran *et al.* (1996), namely the bound test. If the statistical F-value is greater than the first difference value at the 5% significance level, then the variables have a long-term cointegration and pass the test (Table 5). From the results of the bound test, it is found that the F-statistical value (2.786) is greater than the F-critical value (2.08) at the 5% significance level, meaning that the variables in this study have long-term cointegration.

Model testing is carried out to ensure the suitability of the model by conducting diagnostic and stability tests. Diagnostic tests are performed by testing the correlation test and heteroscedasticity test. Table 6 indicates that the probability values of autocorrelation and heteroscedasticity test are greater than 0.05%, meaning that the model is free from autocorrelation and heteroscedasticity problems.

A stability test is conducted to see the stability of the model by using the CUSUM test. The result of the CUSUM test in Figure 1 shows that the CUSUM line is on the line of the 5% significance which means that the model is stable.

| F-bounds test | | | Null hypothesis: No levels relationship | |
Test statistic	Value	Signif. (%)	I(0)	I(1)
F-statistic	2.786921	10	1.8	2.8
K	9	5	2.04	2.08
		2.5	2.24	3.35
		1	2.5	3.68

Source: Authors' own

Table 5.
Results of bound test

Test of goodness of fit	Analysis result (probability)
Test of autocorrelation	0.787
Test of heteroscedasticity	0.220

Source: Authors' own

Table 6.
Results of diagnostic test

Source: Authors' own

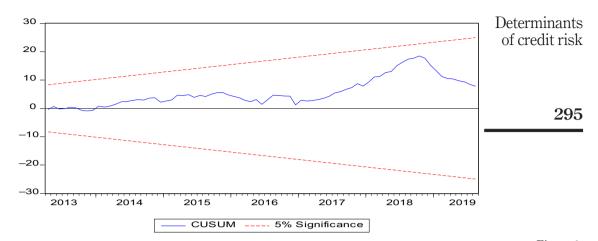**Figure 1.**
Result of CUSUM test

Discussion of long run results

The statistical analysis of each variable in the long run shows the variation result. It is found that inflation does not influence financing risk. The data shows that in the long run, inflation declined in the period 2013–2016, i.e. inflation was high in 2013 and 2014 but then went down in 2015 and 2016. This means that inflation may not have a significant impact on the activities of Indonesians, including the financing activities of SRBs.

This study finds that economic growth does not have an influence on NPF in SRBs in the long run. According to Firmansyah (2014), a high or low GDP will influence the ability of people to repay their obligations and thus will have an impact on NPF. Nonetheless, the bank's financing approval process, which examines the capability and capacity of customers to make repayments, will also influence smooth installment repayments. Therefore, economic conditions may not influence the bank's returns from financing if borrowers with the capacity to repay are selected. Hasna *et al.* (2019) state that when inflation is rising, it will impact on the rising yield of State Sharia Securities (SBSN) and thus, the financing of Islamic banks may be directed to the financing of SBSN.

In addition, the financing of SRBs was dominated by SMEs, which have an important role in supporting the economy. The economic crisis of 1998 shows that SMEs can survive crises better than larger companies (KNKS, 2019). However, high levels of NPF can occur because of mismanagement of financing distribution to economic sectors that are not booming, so that it does not affect economic growth.

This study finds that interest rate negatively influences NPF in the long term. When the bank rate increases, conventional banks tend to increase their deposit interest rates as well as lending rates to maintain their profitability. This can encourage third-party funds to move to conventional banks rather than to Islamic banks/SRBs, if profit rates shared by Islamic banks/SRBs are not raised accordingly. This may lead SRBs to decrease their financing, thus resulting in a lower NPF.

This result is different from that of Adebola *et al.* (2011), who state that interest rate has a significant positive effect over the long term, whereas Haniifah (2015) shows no significant positive effect between interest rate and NPF. SRBs do not apply interest rates in their

operational activities. However, there is competition between conventional and Islamic banks (Trinugroho *et al.*, 2021). When interest rates rise, SRBs tend to reduce expansion in the distribution of financing because the cost of third party funds becomes expensive to compensate for conventional banks. SRBs are more interested in placing their funds in SBSN which provide good returns compared to channeling funds in the form of financing. SBSN use a yield or equivalent rate. When SBSN yields increase, financing in SBSN by Islamic banks also increases (Hasna *et al.*, 2019). SRBs can reduce the risk of financing when interest rates increase by investing in SBSN, and therefore, the small financing distribution will impact on a smaller NPF.

CAR has a significant and positive relationship with NPF in the long run. SRBs' financing from 2010 to 2019 was mostly disbursed in the form of productive loans (working capital and investment financing) which reached 60% of total financing (FSA, 2020). The placement of risk-weighted assets in SRBs is high. High NPF rates on commercial loan financing require high CAR reserves. Effendi *et al.* (2017) and Supriani and Sudarsono (2018) also show a significant positive influence between CAR and NPF in Indonesian Islamic banks. CAR is a form of SRBs' capital capacity. SRBs management may feel confident when there is an improvement of their CAR and attempt to increase the volume of financing without necessarily considering the repayment ability of customers. Consequently, it increases the potential for NPF to increase because of less optimal screening and monitoring processes for prospective customers.

Table 4 also shows that FDR does not have an influence on the NPF of SRBs in the long run. When financing is managed properly by assessing each customer's risk level, a large or small amount of financing will not influence NPF. This result is in line with Havidz and Setiawan (2015), Dwihandayani (2016) and Muhammad *et al.* (2020). Furthermore, as noted earlier, the NPF for SMEs' financing is higher than for non-SMEs although total financing provided to non-SMEs is higher than that to SMEs. Hence, it is important for SRBs to manage the level of financing disbursed for both SMEs and non-SMEs to minimize the NPF level. According to Havidz and Setiawan (2015), the influence of FDR is not significant because financing risks are rather influenced by portfolio management financing, i.e. good or bad management. Muhammad *et al.* (2020) state that there are two possibilities when FDR has no effect on NPF. First, SRBs get profit not only from financing, but also investment in SBSN or the financial market. Second, SRBs provide more low-risk financing (such as *murābaḥah*) than PLS financing.

The statistical result shows that profitability or ROA has a significant positive influence on NPF in the long run. Profitability is very important to attract investors to invest their funds in the company. A high level of financing that is distributed is expected to result in a high profit, although the possibility of having a high percentage of NPLs as a consequence can occur. SRBs face competition not only with conventional banks but also with Islamic commercial banks, and it may encourage them to increase their level of financing to generate higher profits, and this may result in high NPF also. The result is in accordance with the findings of Setiawan and Putri (2013).

OER has been found to have no effect on NPF, which indicates that the efficiency or inefficiency of SRBs does not influence NPF in the long run. This can be explained in two ways. First, according to data from FSA (2019), *murābaḥah* financing of SRBs dominated their financing distribution by 75.6%. The profit from *murābaḥah* financing can be calculated with certainty based on the value of the margin on the price of the goods. Therefore, SRBs can rely on the performance of *murābaḥah* financing in determining a high or low NPF and may not look at the efficiency of SRBs' activities. Second, the management of SRBs may not prioritise the reduction of NPF

levels. The efficiency of Islamic banks is lower than conventional banks (Chamberlain and Khokhar, 2020; Trinugroho *et al.*, 2021). Therefore, NPF settlement in Islamic banks can be done through litigation and non-litigation processes. Litigation resolution will be more expensive than non-litigation because it requires more resources and time. If OER is unable to significantly reduce the NPF level, management tends to seek non-litigation solutions that are less costly but have a risk of a protracted settlement.

However, banks need to evaluate their activities that can cause inefficiency because it will influence the banks' performance. Suryanto (2015) explains that bank efficiency is related to the quality level of management and the effectiveness of the products and services offered. Better quality management will enhance efficiency in the operational activities of the bank.

This paper finds that FTV does not affect NPF in the long term. FTV is related to contracts of sale and purchase such as *murābaḥah, istiṣnāʿ, mushārakah mutanāqiṣah* and *ijārah muntahiyah bittamlik*. Sutanto (2012) noted that the purpose of the LTV policy is to relocate between consumption and investment loans to ensure a balance between the two types of financing. In September 2019, *murābaḥah* financing distributed by SRBs amounted to 75.6% of total financing, followed by *mushārakah* (9.62%) and multi-purpose financing (9.57%) (KNKS, 2019). However, the composition of financing based on types of usage consisted of working capital (37.75%), investment (14.93%) and consumption (47.32%). Financing for consumption purposes still dominated the financing of SRBs. It may cause FTV not to influence NPF in these banks.

In the long run, PLS has a negative effect on NPF. It means that an increase in PLS will result in a lower NPF. There are several possible reasons why that happened: first, SRB financing is dominated by non-PLS financing, so there is a possibility that NPF will occur because of a problem in non-PLS financing. Data as at September 2019 shows that SRB financing is dominated by *murābaḥah* financing (75.6%), whereas the NPF level continues to increase. So when PLS is low but NPF is high, NPF may arise from the higher portion of non-PLS financing. This is in accordance with the argument by Widarjono and Rudatin (2021) that the increase in NPF can be influenced by the distribution of concentrated financing in Islamic banks. Second, generally, risk of PLS financing is higher than other types of financing. When SRBs have higher PLS financing, the management may apply high risk mitigation to prevent NPF, and therefore, it will impact on lower NPF.

Conclusion

Managing financing risks at the level of the Islamic banking industry is important because it is one of the key financial performance measurements. NPF must be managed well to maintain the sustainability of Islamic banks. This study attempts to examine the influence of internal and external factors on NPF in SRBs. Internal variables examined are: FDR, CAR, ROA, OER, FTV and PLS financing ratio. External variables comprise inflation, economic growth and interest rate.

The findings indicate that there are four variables that have a lag in the short run, namely, NPF, inflation, CAR and PLS. Furthermore, the long run results show that CAR and ROA influence NPF positively, whereas inflation and PLS have a negative influence on NPF. The rest of the variables, including economic growth, interest rate, FDR, FTV and OER do not have an influence on NPF in SRBs.

The results show that internal factors tend to dominate the NPF level of SRBs in Indonesia. This is understandable because SRBs are local banking institutions and face a different environment compared to Islamic commercial banks, which operate on the national

banking scale. Therefore, the ability of SRBs' management to understand business complexity and risk management may influence their capability in monitoring and controlling potential financing problems. The different results found for the short run and long run for certain variables require the banks to adopt the right strategy in accordance with these estimates.

SRBs must also meet the central bank's NPLs/NPF requirements that have been issued for the banking industry. They need to more carefully screen prospective customers and the guarantees they can provide in the early stage of financing approval to reduce the risk of default. SRBs also need to develop the necessary competency in managerial and risk management to improve their understanding of business risks and risk mitigation with regard to SMEs' customers. SRBs tend to attract more SMEs' customers as the latter are considered less bankable when they seek financing with commercial banks; thus, they turn to SRBs to fulfill their financing needs because it is easier to meet these banks' conditions. Thus, to manage the credit risk arising from the financing of SMEs, SRBs should adopt the right risk management mechanism.

The findings of this study would be helpful to the regulator for it to determine policies that accommodate the characteristics of SRBs because excessive NPF can disrupt the continuity of the banks and affect the economic growth of a nation. Regulations can focus on the improvement of the corporate governance structure in SRBs to increase the competency and experience of management in controlling, monitoring and mitigating financing risk especially for SMEs' customers.

It is noted that several of the findings of this study are different from those reported in previous studies. This might be because of the difference in research subjects with different characteristics. This study examines the case of SRBs, whereas previous studies mostly discussed Islamic banks. Future research can try to analyze those differences in greater depth.

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