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Measuring Optimal Portfolio for Selected Financing Contracts of Islamic Banks in Indonesia

Dimas Bagus Wiranatakusuma[1], and Aurellia Azh Nindy[2]

ABSTRACT

Financing is the primary factor in boosting the operational performance of Islamic banks. Financing is a productive asset that is susceptible to risk. The research mainly aims to find the optimal limit that can be tolerated in order to improve the operational performance of Islamic banks. The research objects cover Mudharabah, Musharakah, Murabahah, and Istishna financing contracts. This study shows the optimal level of Mudharabah growth should be between 1% and 4%, Musharakah growth should be between 3% and 6%, Murabahah growth should be between 2% and 3.6%, and Istishna growth should be between 1% and 3.7%.

Keywords: Islamic Banking, Optimal Threshold, Financing Contracts, Vulnerability

JEL Classification: C14, E32, G11, G21

[1]Universitas Muhammadiyah Yogyakarta, Indonesia & International Islamic University, Malaysia, Email : dimas_kusuma@umy.ac.id
[2]Universitas Muhammadiyah Yogyakarta Indonesia

I. INTRODUCTION

The banking sector plays a crucial role in propelling the national economy forward. In the execution of its operational framework, Islamic banking engages in the process of mobilizing funds from the general public. Subsequently, these funds are directed towards entities with financial deficits, accompanied by the application of compensation mechanisms aligned with Sharia principles. This particular approach sets it apart from conventional banking practices that often lean towards speculative activities. The development of financing contracts in Indonesia is dominated by four contracts, such as Mudharabah, Musharakah, Murabahah, and Istishna. Profit Loss Sharing (PLS) Financing and Non-PLS Financing exhibit distinct features and individualistic qualities. Moreover, Islamic banking displays varying inclinations towards diverse financing product categories with the aim of enhancing its operational efficacy. Hence, it is imperative for Islamic banks to be guided towards maintaining an optimal financing approach to foster the enhancement of operational performance. This paper aims to identify the ideal extent of specific Sharia-compliant financing within Indonesian Islamic banking. Additionally, it seeks to ascertain the most effective financing agreements that contribute to the attainment of optimal operational performance for Islamic banks.

More specifically, the study aims to anticipate the possibility of failure from various market conditions, provide a policy implication that can help policymakers prepare various policies to reduce the impact of economic instability, detect risks in financing products as related indicators, and form an optimal portfolio of the selected financing instrument. In order to contribute to the Islamic banking literature, this paper tries to do the statistical analysis in determining the optimal portfolio, mitigation risks to address financing risks, using the Early Warning System in detecting market conditions, and linking the Islamic modes of finance with optimal financing performance and resilience, which had not previously been found in the existing literature.

The involvement of Islamic bank financing has extended to both the real sector and the consumption sector, a connection that comes with the inherent risk of non-performing financing. Islamic banks encounter three primary risks: liquidity risk, credit risk, and financing risk. These risk categories are analogous to the concept of credit risk, a term predominantly associated with conventional banks but equally applicable to financing within Islamic banking. Non-performing financing falls under the classification of financing risk, frequently linked to the potential of default, where borrowers are unable to reimburse the capital or profits procured from the bank (Nasution, 2018). The origin of financing risk can stem from financial, business, industry risks, and debtor

management, intertwining in a highly intricate manner (Charles Schell in Nasution, 2018).

The correlation between financing risk and market risk involves a devaluation of collateral attributed to a decline in the market value of the pledged asset due to unfavorable shifts in market variables, notably interest rates. Market risk encompasses interest rate risk, foreign exchange risk, price risk, and liquidity risk. As outlined by Wiranatakusuma and Duasa (2016), liquidity risk, credit risk, and exchange rate risk are inherent components due to factors such as Indonesia's adoption of a dual banking system. This leads to intricate interconnections between the growth of conventional banking and Islamic banking, impacting the behavior of Islamic depositors who still respond to interest rates from conventional banks. Furthermore, the operational practices of Islamic banks, which predominantly center on debt and trade-based transactions rather than equity-based contracts, contribute to the challenge. While financing products play a significant role in enhancing the quality of productive assets for Islamic banks, they also become a major source of operational risk. This situation gives rise to problematic financing that can disrupt operational performance and bank liquidity (Andrianto & Firmansyah, 2019). Selecting the incorrect financing instruments for investments could result in losses for Islamic banking. Therefore, Islamic banks are compelled to accurately determine suitable financing instruments for investment, the appropriate allocation of funds, and optimal investment timing (Wibowo, 2014).

The emergence of risks can be effectively mitigated through strategies aimed at constructing an optimized portfolio. An optimized portfolio is one strategically structured to achieve the most favorable balance between expected returns and associated risks. This optimal portfolio configuration can drive profit growth, consequently bolstering the income generated by Islamic banking. This holds particular significance as financing instruments represent a productive facet of Islamic banking operations. The earnings stemming from the principal business activities contribute to operating income, thereby augmenting operational performance. As articulated by Helfert (1997), profitability encompasses the capacity to evaluate a company's managerial efficacy concerning operational efficiency, capital utilization, and the profitability derived from deployed assets. Thus, the accrued profits serve not only to ensure the sustainability of the business entity but also to elevate its operational prowess.

Risk mitigation can be carried out through a monitoring strategy, stress identification, risk assessment, and risk signaling, as well as the development of appropriate policy instruments (Bank Indonesia, 2016). Thus, a series of monitoring indicators and methods are needed that are capable of capturing

imbalances, determining optimal threshold values, and assessing potential losses to maintain stability and optimize the operational performance of Islamic banks in Indonesia. One method that can be used is the EWS (Early Warning System). Kusuma and Asif (2012) argue that risk can be mitigated by the EWS (Early Warning System) method. Adiwarman Karim in Nasution (2018) argues that risk management functions as a filter or EWS (Early Warning System). The early warning system is very important, and needs to be done to predict the performance of Islamic banking and provide information about problems that may be faced by Islamic banking. Besides, with the EWS for Islamic banking, it will save bank band performance costs or failure for depositors, owners, and the public (Kusuma & Asif, 2012).

Building upon the aforementioned context, this research endeavors to examine and mitigate risks through the application of a monitoring indicator, specifically a composite indicator. The aim is to ascertain the optimal performance level. As advocated by Indonesia Bank (2016), a composite indicator functions as a tool for risk assessment, amalgamating pertinent indicators to evaluate the potential for systemic ramifications and to serve as an Early Warning Indicator (EWI) for the detection of financial crises. This framework stands to provide Islamic banks with guidance in allocating their funds and enhancing asset quality to align with optimal strategies. This, in turn, can lead to heightened liquidity and profitability, crucial indicators of robust bank operational performance. The resulting strengthened operational performance not only preserves the resilience and stability of Islamic banks but also contributes to their overall effectiveness.

In order to determine the optimal level of Islamic banking financing, this study presents an "ideal sequence" of 15 (fifteen) steps recommended by the OECD (the Organization for Economic Co-operation and Development), starting from the theoretical framework to the presentation and distribution of composite indicators. The choices made in one step can have important implications for others. Composite indicators are also created to identify whether they are compatible with each other. The result shows the optimal level of each financing product, which can improve and enhance the performance of Islamic banks in every economic condition.

This paper is expected to prove beneficial for many parties, such as the government and policymakers, by helping them create new policies to improve the operational performance of Islamic banking; this research can be used as a reference for developing the operational financial system; and it will provide new knowledge and insights about Islamic banking in Indonesia.

II. LITERATURE REVIEW

Interest-based systems are frequently losses since the use of interest causes a deterioration in the conventional economic system because of the large expense that must be borne when interest rates rise. Islamic modes of finance are needed to avoid crises and achieve stability in the economy. Rizvi et al. (2020) found the presence of Islamic banks did not affect profitability but made the banking industry more stable. Islamic banks have increased the growth of loans and deposits in the banking system, demonstrating that they have contributed to stability through asset and liability channels. Thus, it can be concluded that the distribution of funds can create stability in the banking industry; the more the quality of the productive assets increases, the more stable the operations of Islamic banks will be. Similarly, Hafnida, Maamor, and Abdullah (2015) shows that mudharabah, musharakah, murabahah, istishna, and ijarah as Islamic modes of finance have a positive and significant relationship affecting Islamic financial intermediation, which means that if the number of Islamic modes of finance increases, it will increase Islamic financial intermediation. In conclusion, Islamic modes of finance are one of the tools that can be used by financial intermediaries.

However, it cannot be denied that financing is vulnerable to risk, which triggers problematic financing that can disrupt the operational performance of banks. Therefore, it is necessary to have special supervision to minimize these risks. Ismal (2015) argues that risk has a very significant negative effect on the performance of Islamic banks. Islamic bank financing performance depends on economic and business conditions, so an important action for Islamic banks is to maintain prospective financing performance to reduce risk. Mudharabah and Murabahah, as the most optimal prospective financing, can maintain sustainable performance to strengthen the operational performance of Islamic banks. According to the research conducted by Ascarya, Karim, and Anwar (2013), the Mudharabah PLS contract has the highest return, and the Murabahah non-PLS (non-profit-loss sharing) contract has the smallest risk, which is good for Islamic banks to choose to increase PLS (profit-loss sharing) financing when financial conditions are stable and increase non-PLS (non-profit-loss sharing) financing when a crisis occurs. In conclusion, PLS (profit-loss sharing) and non-PLS (non-profit-loss sharing) financing affect the resilience of Islamic banks in all economic conditions by maximizing their profits by accepting more risks during a crisis. However, Khan and Bhatti (2008) argues Islamic banking faces core problems and challenges that will have a major impact on its growth and development in the future, so Islamic banks need to improve their liquidity, corporate governance, and risk management techniques. Sharia banks must

replace the excessive use of murabahah financing with PLS (profit-loss sharing) financing to respond to the growing crisis in human resource management.

Belkhaoui, Alsagr, and van Hemmen (2020) states that this study provides Mudharabah and Musharakah harm by increasing credit risk (bad financing), while Murabahah financing has a positive effect on increasing profitability and increasing the capitalization ratio and cost efficiency, so that it directly and indirectly affects the performance of Islamic banking. Anggraeni (2018) indicates the largest composition of financing, such as Istishna and Murabahah financing, is in the second position with a portfolio return rate greater than portfolio risk. Thus, the formation of an optimal portfolio cannot only increase the profitability of Islamic banks but also reduce the level of risk that exists, so that the profits of Islamic banks can also increase with increasing assets.

In contrast, HGB (2017), found that the variable murabahah can lead to financial stress. In the banks, variable Istishna is the best mode of finance to minimize financial stress and affect the increase in gross domestic product.

Financing risk can create systemic risks that lead to a loss of confidence and increased uncertainty in the financial system, which can threaten the stability of the Islamic banking system and have negative effects on the economy. The performance of Islamic banking depends on economic and business conditions. Therefore, an early warning system is needed to detect crises due to various market conditions. Wiranatakusuma and Duasa (2016) shows that an Early Warning System (EWS) is widely used as a surveillance mechanism for preserving financial system stability. The results suggest that there are several indicators that IBRI, which is composed of standardized deposits and financing, is able to figure out the resilience of Islamic banking. Wiranatakusuma and Asif (2012) suggest developing an in-sample and out-sample model for Islamic banking crises by using four selected leading indicators with various threshold levels and signaling horizons. In the future, EWS will be very important as one part of the surveillance mechanism for monitoring banking system operations, including Islamic banking. Nurfalah and Rusydiana (2018) aim at detecting early indicators that cause conventional banking and Islamic banking crises, identifying the longest crisis periods for both types of banks, and comparing the stability between the two kinds of banks. The results show that Islamic banking is more stable against internal and external shocks than conventional banking.

There are gaps in the literature on the optimal portfolio of Islamic banks, such as a lack of empirical evidence and statistical analysis in determining the optimal portfolio; no optimal level of financing; a lack of studies on risk

mitigation to address financing risks; a lack of studies on the Early Warning System in detecting market conditions; and no framework description of the linkage between Islamic modes of finance and optimal portfolio financing performance and resilience. Thus, this paper tries to mitigate the risks through statistical analysis using composite indicators combined with the Early Warning System to find the optimal level of each financing in order to maintain the performance of Islamic banks in market conditions.

III. RESEARCH METHODS

A. Research Objectives

The objects in this study focus on Mudharabah Financing Products, Musharakah Financing, Murabahah Financing, and Istishna Financing for the 2004–2020 period. The research period used data from 2004–2020, following the availability of monthly data for 12 months at the Financial Services Authority in Indonesia. In addition, the selection of data for the 17 years is motivated to determine the condition of Islamic banking financing in the past, present, and future, whether it is in optimal or non-optimal conditions, so that it can serve as a guideline for Islamic banking to improve its performance and increase its financing to an optimal level to achieve optimal operational performance.

The data used in this study are secondary data sources. Secondary data sources are indirect data sources that can be obtained through other media and are sourced from related company data. The data in this study were obtained from official publications of the Financial Services Authority (OJK).

B. Steps for Constructing a Composite Indicator

This study presents an "ideal sequence" of 15 (fifteen) steps recommended by the OECD (the Organization for Economic Co-operation and Development), starting from the theoretical framework to the presentation and distribution of composite indicators. The choices made in one step can have important implications for others. So that not only the methodology is right, composite indicators are also created to identify whether they are compatible with each other. In developing composite indicators, it is necessary to be transparent in order to avoid misinterpretation of data and produce reliable indicators. The steps in developing composite indicators are as follows:

B.I. Theoretical Framework

The theoretical framework is a set of systematically interconnected and closely related concepts that form a view of the problem that is the focus of researchers' research to predict a phenomenon using relevant theoretical

criteria. In compiling composite indicators, the theoretical framework is the first step that must be taken by clearly explaining the problem to be measured and its sub-components.

1. Tranforming Data into Index

As a basis for evaluating the relationship between indexes, individual indexes serve to state each variable, with other variables achieving the same goal. At this stage, normalization is needed to develop the index because the index in a data set often has different units of measurement. Normalization is used to compare and combine variables that are initially measured in very different units. Normalization also takes into account outliers in the data. The normalization formula is as follows:

$$I_{it} = \frac{(X_{it} - \bar{X}_i)}{\sigma_i} \times \quad (1)$$

2. Selecting Base Year

The base year is considered to be the fundamental equilibrium, and the deviation of all individual indexes is as small as possible. The selection of the base year is calculated based on the standard deviation and the mean in order to compare the spread over two or more sets of observations. When the standard deviations for a group of observations and the mean are nearly the same, the data are not scattered and are clustered closer to the mean. This stage is combined with the signal extraction approach so that the tolerable threshold is shown by the value that gives the lowest loss function.

$$S = \sqrt{\frac{1}{N-1}} \sum_{i=1}^{N} (X_t - \bar{X})^2 \quad (2)$$

$$\bar{X} = \frac{\sum x}{N} \quad (3)$$

3. Determining Weight

Each component of the indicator index used has its own weighted index. In this case, a higher weight indicates the role of the variable is increasingly important and has an effect on the composition of the financing. The resulting weights have an important impact on the results of the composite indicator, so the weighting model needs to be made explicit and transparent because, basically, the weights aim for value assessments and have the property to make explicit the objectives underlying the construction of composite indicators.

$$Weighted\ Index_{ij} = \frac{Average\ of\ Variance_{ij}}{Total\ Variance} \quad (4)$$

4. Index Aggregation

In forming an aggregate index, it is necessary to group each variable into a group. This index is useful as a representation of the objectives of each grouped variable. Based on the literature review and theoretical framework, it produces the following composite indexes based on the following TABLE 1:

TABLE 1
Constructing a Composite Index

Dimension	Individual Index
Composite Index	Mudharabah Index (IMudharabah) Musharakah Index (IMusharakah) Murabahah Index (IMurabahah) Istishna Index (IIstishna)

Source: Author

Several index variables are grouped to determine the scope of the objectives. This study determines the composite index with the following formula:

$$\text{Financing Composite Index}_t = w * \text{IMudharabah}_t + w * \text{IMusharakah}_t + w * \text{IMurabahah}_t + w * \text{IIstishna}_t \quad (5)$$

5. Utilizing Factor Analysis

Coherence reflects the extent to which they are connected logically and consistently. In the context of this research, there are two important aspects: coherence across time and across countries. This stage uses the AHP (Analytic Hierarchy Process), which is a method of making decisions by translating complex problems into a hierarchy consisting of three levels: the final goal, criteria, and alternatives. The use of HCR (Hierarchical Consistency Ratio) aims to determine the priority hierarchy or priority rank of the composite index constituent variables and test the consistency of coherence between variables.

$$HCR = \frac{CI}{RI} \quad (6)$$

$$CI = \frac{\lambda maks - n}{n-1} \quad (7)$$

$$RI = \frac{1.98*(N-(n-1))}{N} \quad (8)$$

6. Setting the Threshold

This study uses DEMATEL (Decision Making Trial and Evaluation Laboratory) as a multi-criteria decision-making to determine the multiplier threshold (m). The DEMATEL (Decision Making Trial and Evaluation Laboratory) method is used to assist in analyzing complex problems by creating structured models of causal relationships between factors in the system (Falatoonitoosi et al., 2013). This method uses the variables that form a composite index to produce a threshold output. Technically, the multiplier threshold is used to determine the level of resilience of Islamic banking when a shock occurs. In making improvements to the quality and effectiveness of the model, it is necessary to carry out an assessment using different assessment scales depending on the aims and objectives of the researcher. According to Nardo et al. (2005), Assessment of the quality and effectiveness of the model can be done using the following scale sizes of TABLE 2 :

TABLE 2
Criteria of DEMATEL

DEMATEL Scale	Criteria	Granger Casuality
1	Low influence	>10%
2	Medium influence	5%-10%
3	High influence	1%-5%
4	Very high influence	<1%

Source: Nardo et al. (2005)

$$\alpha = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}[t_{ij}]}{N} \quad (9)$$

$$R_i = \left[\sum_{j=1}^{n} t_{ij}\right]_{n*1} = [t_i]_{n*1} \quad (10)$$

$$C_j = \left[\sum_{i=1}^{n} t_{ij}\right]_{1*n} = [t_j]_{n*1} \quad (11)$$

7. Signaling Threshold

As part of the Early Warning System, the signaling threshold helps to detect the possibility of shocks occurring in the economy. A threshold signal is used to detect shocks to the economy.

In determining the signal and crisis, Wiranatakusuma and Duasa (2016) assume that I = a univariate vaiable, j = a particular country, S = signal variable, and X = variable. A variable relates to variable i and country j is expressed by X_i^j and the threshold for this variable is denoted X_i^jas. Then, a signal variable that relates to indicator i and country j is denoted by S_i^j. The binary model is then

developed, where S_i^j = (0,1), and if the variable crosses the stipulated threshold, a signal is emitted, S_i^j = 1.

Thus, based on the TABLE 3, the assignment of codes 0 and 1 to variables in a certain month is based on the multiplier value that has been determined previously.

TABLE 3
Signaling Threshold

Threshold	Criteria	Signal
Upper Threshold	= l_{it} > Threshold Multiplier Value	1 (Yes)
	= l_{it} < Threshold Multiplier Value	0 (No)
Lower Threshold	= l_{it} < Threshold Multiplier Value	1 (Yes)
	= l_{it} > Threshold Multiplier Value	0 (No)

Source: Wiranatakusuma and Duasa (2016)

8. Estimating in Sample Model

The HP (Hodrick-Prescott) filter is one of the tools used in referring to data refinement techniques. The purpose of using the HP (Hodrick-Prescott) filter is to eliminate short-term fluctuations, thus showing long-term trends related to the business cycle. Apart from that, the HP (Hodrick-Prescott) filter also helps in forecasting economic or other business-related cycles.

In this model, the penalty parameter λ has an important role in determining the trend function and as a controller of the fineness of the data. Phillips and Shi (2019) suggest that if λ is chosen too large, then the trend that is installed becomes almost linear, whereas if λ is chosen too small, then the trend that is installed becomes very flexible so that it can create short-term fluctuation elements. The research convention proposes values of λ = 100 for annual data, λ = 1600 for quarterly data, and λ = 14400 for monthly data. Thus, this study uses the research parameter λ = 14400 because the data are monthly.

9. Estimating Out Sample Performance

At this stage, using a matrix crisis signal, the extracted signal from the selected variable can be detected. The signal extraction approach makes it easy to identify the best threshold for each variable and to determine the predictor of the lowest stress episode.

TABLE 4
The Assessment of True and False Signals of Stress Episode Using a Matrix Crisis Signal Framework

Items	Stress occurs in the next *n* months (pre-stress periods)	No stress occurs in the next *n* months (normal periods)
Signal	A (Number of true imbalance signals)	B (Number of false imbalance signals- type II error)
No Signal	C (Number of false balance signals- type I error)	D (Number of true balance signals)

Source: Kaminsky, Lizondo, and Reinhart (1998)

The TABLE 4 shows that A shows a variable that gives off an imbalance signal followed by a stress episode, B gives off an imbalance signal not followed by a stress episode, C does not indicate an imbalance followed by a stress episode, and D does not release an imbalance signal without a stress episode. Thus, the existence of this matrix tends to make it easier to identify any emerging imbalance.

a. Determining the signal horizon.

The signal horizon can be defined through the signal extraction method. The period in which indicators are expected to have the ability to anticipate crises, Bussiere and Fratzscher (2006), in their research, determined signal horizons of 6, 12, and 18 months. Considering various conditions and previous studies, this study uses five signaling horizons, namely 1, 3, 6, 12, and 24 months.

b. Determining evaluation criteria

Determining the quality of the crisis signal is needed to assess the performance of the indicators.

c. Probability forecasts for events

A good probability forecast for an event will be obtained when the optimal threshold can be determined by minimizing the expected loss function, which is the sum of type I and type II errors with weights associated with each type of error, as shown in equation:

$$L(\mu, \tau) = \mu P T_1 + (1 - P) T_2 \quad (12)$$

d. Evaluation of the probability forecasts

The primary measurement of statistical accuracy of the forecasted probability are the probability scoring rules where practically the QPS

(Quadratic Probability Score) is used as the most common scoring rule, as shown in equation:

$$QPS = \frac{1}{T} \sum_{t=1}^{T} 2 \left(P_{T+t} - R_{T+t}\right)^{t} \quad (13)$$

Note: *The QPS (Quadratic Probability Score) ranges from 0 to 2, with a score of corresponding to perfect accuracy*

The next step is to conduct a calibration test which can be measured by GSB (Global Squared Bias):

$$\text{GSB} = 2 \left(\bar{P} - \bar{R}\right)^2 \quad (14)$$

Note: *The GSB (Global Squared Bias) ranges from 0 to 2, with GSB = 0 which corresponds to perfect global calibration, which occurs when the average probability estimate is equal to the average realization.*

The measurement of basic data quality criteria can only be done by using an optimal threshold. Thus, to meet baseline data quality, the optimal threshold must meet the following criteria: the minimum loss function, the lowest QPS (Quadratic Probability Score), the lowest GSB (Global Squared Bias), and the optimal signal horizon.

10. Summarizing Out Sample Model

The early warning system method in the out sample model has been carried out in the previous stage. The next step is to summarize the resulting performance from the previous output. The choice of time horizon is based on the smallest GBS (Global Squared Bias) or QPS (Quadratic Probability Score) value with a value ranging from 0 to 2. GSB (Global Squared Bias) close to 0 reflects a perfect calibration. Meanwhile, a QPS (Quadratic Probability Score) that is close to 0 reflects a very accurate model.

11. Determining the Optimal Level in Index Value

The optimal level in this study is defined as the best level, where the variable performance exceeds the average performance. In this case, each variable has various characteristics that determine the optimal level. The threshold index setting is taken from the upper and lower threshold levels, which are multipliers of the standard deviation (S) and the mean, which are formulated as follows:

$$Upper\ Threshold = \bar{X} + (m * S) \quad (15)$$

$$Average\ (\bar{X}) = \frac{\sum_{i=1}^{n} Xi}{n} \quad (16)$$

$$Lower\ Threshold = \bar{X} - (m * S) \quad (17)$$

12. Determining the Optimal Level in Real Value

The transformation of the model into original data aims to determine the real condition of Islamic banking financing, whether it is at the optimal level or the vulnerability level. The resulting optimal level reflects the best possible state, which provides an appropriate evaluation standard. As assumed by economists, the optimal level is described as a condition in which the company gets the highest possible profit. When a condition is outside the optimal range, risks can occur. The determination of the optimal level needs to be done with care because it affects the assessment and decision-making processes.

13. Setting the Heat Map

A heatmap is a visualization or mapping that displays data with different color representations. The use of heatmaps on data tends to be easier to understand with a visual representation of colors. The use of color indicates the level of vulnerability of the indicators used. In this study, heat maps were used to show all index results in terms of pressure, non-optimal, and optimal Islamic banking financing with reference to the threshold. Thus, the existence of a heat map can make it easier to see the source of the vulnerability.

On the heat map, there are three colors used to make it easier to see the condition of Islamic bank financing in Indonesia. The colors used in the heat map refer to the optimal threshold, non-optimal threshold, and vulnerability.

14. Visualization

Visualization is done to interpret the results accurately and clearly. The visualization shows the conditions under which Islamic banks operate at optimal levels—not optimal levels—and are vulnerable. This step must be taken with caution, considering that visualization can affect the interpretation and thus the optimization of Islamic banking operations. With a visualization that displays the optimal level, it helps Islamic banking maximize returns and minimize risks.

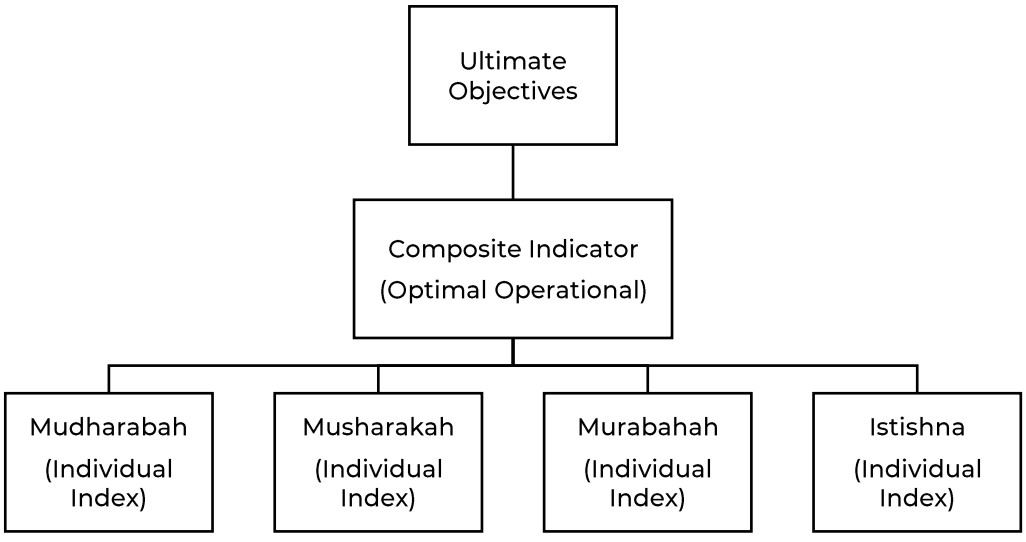
IV. RESULTS AND ANALYSIS

A. The Result of Steps for Selecting the Financing Indicators

Financing is one of the largest sources of income for Islamic banks, as well as the biggest source of business operating risk. This condition is further complicated by the different characteristics of each financing product. Therefore, this chapter tries to elaborate on several problems, such as selecting financing indicators that can contribute to and have a positive impact on optimizing Sharia banking operations and determining the optimal level of selected Sharia banking financing. This section describes the results of the next 15 steps developed in Chapter III.

1. Theoretical Framework

The selected data must be able to describe the operations of Islamic banks as a composite indicator. There are three mechanisms in the operational system of Islamic banks, namely fundraising, financing, and financial services (Wiroso, 2011). Financing is included in the component of productive assets, so it is an important factor for the development of Islamic banks. Asset financing is defined as a resource that needs to be managed carefully in order to generate profitability. There are four financing products that dominate in Indonesia and are used by researchers as financing indicators: Mudharabah, Musharakah, Murabahah, and Istishna.



Source: Author

FIGURE 1
Theoretical Framework

In optimizing the operations of Islamic banks, this study aims to obtain an optimal threshold from the selected financing contracts that can be tolerated in order to obtain optimum profitability, which will affect the operational performance optimization. The emergence of shocks due to exceeding or less than the optimal threshold will be indicated by the relevant indicators. Thus, based on FIGURE 1, the hierarchical level is needed to build the index in order to achieve the final objective of the index, which is to be a tool to test the optimal limits and the limits of tolerable shocks that will contribute to optimizing operational performance.

2. Transforming Data into Index

Based on TABLE 5, each variable shows the smallest standard deviation that is different. The use of individual indexes as a basis aims to evaluate relationships for a specific purpose, which can imply several individual indexes. This is a function that states each variable with other variables that show its desires following the expected consequences associated with the same goal. The indexing process refers to the smallest standard deviation and its average. The smallest standard deviation is used as a benchmark for making individual indexes for each variable.

TABLE 5
Component of Individual Index

Year	STANDARD DEVIATION							
	Mudharabah	Mean	Musharakah	Mean	Murabahah	Mean	Istishna	Mean
2004	0,05	0,08	0,11	0,13	0,04	0,06	0,14	0,01
2005	0,02	0,04	0,04	0,03	0,02	0,02	0,02	-0,01
2006	0,01	0,02	0,04	0,02	0,03	0,02	0,03	0,02
2007	0,02	0,03	0,06	0,06	0,02	0,02	0,03	0,00
2008	0,03	0,01	0,02	0,04	0,03	0,03	0,03	0,01
2009	0,11	0,01	0,02	0,03	0,01	0,01	0,03	0,01
2010	0,03	0,02	0,02	0,03	0,01	0,03	0,04	-0,01
2011	0,02	0,01	0,02	0,02	0,01	0,03	0,04	-0,01
2012	0,02	0,01	0,02	0,03	0,02	0,04	0,05	0,02
2013	0,02	0,01	0,02	0,03	0,01	0,02	0,05	0,03
2014	0,02	0,00	0,02	0,02	0,01	0,01	0,02	0,01
2015	0,03	0,01	0,02	0,02	0,01	0,00	0,01	0,02
2016	0,03	0,00	0,02	0,02	0,03	0,01	0,02	0,01
2017	0,03	0,01	0,03	0,02	0,01	0,01	0,01	0,03
2018	0,05	-0,00	0,03	0,02	0,01	0,00	0,01	0,03
2019	0,02	-0,01	0,01	0,02	0,00	0,00	0,01	0,02
2020	0,03	-0,01	0,01	0,01	0,01	0,01	0,00	0,01

Source: Author's calculation

3. Selecting Base Year

To identify the period during which leverage begins, the year with the lowest standard deviation is determined (Shimizu and Ogawa, 2005). Based on TABLE 6, 2006 was chosen as the base year for mudharabah, 2020 was chosen as the base year for musharakah and murabahah, and 2019 was chosen as the base year for murabahah. The base year selected indicates that the leverage will begin soon with an Islamic bank.

TABLE 6
Individual Indicator Base Year

Variables	Base Year
Mudharabah	2006
Musharakah	2020
Murabahah	2019
Istishna	2020

Source: Author's calculation

Leverage is defined as the use of funds to finance the purchase of an asset with the hope that the income from the business will exceed the costs distributed. Financial leverage can result in disproportionate losses due to insufficient returns on assets. The entry of financing into the leveraging phase was caused by uncontrolled financing that was distributed when there was a shock to the economy due to pressures or crises, which caused various risk to occur. Thus, it is necessary to carry out an analysis to determine the optimal level of financing and an understanding of the characteristics of each financing contract in order to minimize risk and maximize return.

4. Determining Weight

Based on TABLE 7, Imusharakah and Imurabahah are financing indicator index variables that show significant results. To optimize their operations, Islamic banking must consider Musharakah and Murabahah financing.

TABLE 7
The Output of Determining Weight

Year	PLS Contract		Trading Contract	
	I.Mudharabah	I.Musharakah	I.Murabahah	I.Istishna
2004	7,30	7,82	9,31	5,29
2005	2,60	7,94	7,36	2,76
2006	1,00	8,41	9,50	3,46
2007	1,94	9,73	9,21	3,41
2008	3,43	5,53	9,86	7,05
2009	2,39	2,42	6,42	6,58
2010	3,19	3,11	4,74	5,67
2011	1,19	2,96	7,42	7,06
2012	1,41	4,38	9,65	4,42
2013	1,79	2,89	6,01	8,43
2014	1,22	4,88	2,78	3,72
2015	3,08	2,10	3,23	4,88
2016	3,74	5,41	2,11	6,83
2017	4,21	6,33	4,45	3,25
2018	8,62	6,78	4,99	1,13
2019	2,59	1,99	1,00	0,99
2020	5,79	1,00	2,32	1,00
Average	3,26	4,92	5,90	4,47
Weight	0,18	0,27	0,32	0,24

Source: Author's calculation

Based on current conditions, musharakah and murabahah financing are the products with the highest financing composition. According to Islamic banking statistics, murabahah financing has the highest composition of financing, which reached IDR 175.979 billion in February 2021. followed by musharakah, with the growth reaching IDR 172.412 billion in February 2021 (OJK, 2021). Musharakah and mudharabah financing are in great demand in Indonesia. The high level of financing must be accompanied by controls to avoid the risk of financing, considering that the high amount of financing does not guarantee the high amount of income to be received. Thus, a threshold level is needed so that financing does not lead to a vulnerability phase and the possibility of risk can be minimized.

5. Index Aggregation

For an aggregate index, each variable needs to be grouped into one group. This index is useful as a representation of the objectives of each grouped variable. Several index variables are grouped to determine the scope of the

objectives. This study determines the composite index with the following formula:

Financing Composite Index$_t$ = 0,18 * IMudharabah$_t$ + 0,27 * IMusharakah$_t$ + 0,32 * IMurabahah$_t$ + 0,24 *IIstishna$_t$

A study suggests that Indonesian Islamic banking is supported by four dominant financing instruments, namely Mudharabah, Musharakah, Murabahah, and Istishna (Ismal, 2015). Each financing product has its own characteristics. Mudharabah and Musharakah are financed through profit-sharing schemes, resulting in higher risk compared to other schemes (Putra, 2019). Thus, to maximize the income from the four financing instruments, it is necessary to have an optimal threshold following the characteristics of each financing instrument to minimize the risks that arise.

6. Utilizing Factor Analysis

Consistency scores are needed to determine whether the variables in a particular index are logically connected and consistent with each other. Therefore, TABLE 8 describes the steps required to obtain HCR.

TABLE 8
The Hierarchical Consistency Ratio (HCR) among Variables

No	Indicator	Average Lambda (AL)	Consistency Index (CI)	Random Index	Hierarchical Consistency Ratio (HCR)
1	Financing Variables	4,1184657	0,0394886	0,9	0,0438762

Source: Author's calculation

Based on TABLE 8, it can be concluded that all variables have an HCR (Hierarchical Consistency Ratio) of less than 10% (Saaty, 2008). All variables meet the coherence requirements as a measure that can be used to estimate the quality of index data.

TABLE 9
Rank Popularity of Indicators

	Rank Popularity
Mudharabah	4
Musharakah	2
Murabahah	1
Istishna	3

Source: Author's calculation

Based on TABLE 9, Murabahah has the highest level of popularity among other financing products, followed by Musharakah, Istishna, and Mudharabah. This is following current conditions, based on the development of financing contracts in Indonesia, the growth of Murabahah contracts reached IDR 175.979 billion in February 2021. Musharakah financing was followed by financing growth, reached IDR 172.412 billion in February 2021. Mudharabah financing continued to decline until it reached IDR 11.227 billion, lower than in the same month in the previous year, which reached IDR 13.083 billion. Istishna growth continues to increase, with the amount of financing in February 2021 reaching IDR 2.391 billion (OJK, 2021). Thus, the popularity of financing contracts is still dominated by Murabahah.

7. Setting the Threshold

Based on TABLE 10, DEMATEL (Decision Making Trial and Evaluation Laboratory) results as a multi-criteria decision making in the form of a threshold of 0,81. By setting the threshold value, it is hoped that it can help provide information about shocks to the banking system and the use of the threshold as a multiplier threshold can also make it easier to determine the optimal level of Islamic banking financing.

TABLE 10
Multiplier Threshold for the Indicators

T Matrix	Mudharabah	Musharakah	Murabahah	Istishna
Mudharabah	0,69	1,25	0,80	0,83
Musharakah	0,46	0,51	0,39	0,51
Murabahah	1,09	1,32	0,65	0,98
Istishna	0,91	1,24	0,73	0,65
Threshold Alpha Value		0,81		

Source: Author's calculation

8. Signaling Threshold

If it is related to the characteristics of each financing indicator, Mudharabah and Musharakah are financing with the principle of profit sharing and are included in the risky business so that the growth of profit-sharing-based financing must be at an optimal level, not exceeding the upper threshold and not exceeding the lower threshold. Meanwhile, Murabahah and Istishna financing is based on the principle of buying and selling; to achieve optimal income, financing with buying and selling principles can be increased to above the threshold level. Even so, Murabahah and Istishna are fundamentally vulnerable to risk, so care needs to be taken in channeling the funds.

9. Estimating In Sample Model

Based on TABLE 11, the results of the threshold signal show that during the period 2004–2020, the Mudharabah indicator value exceeded the upper threshold 25 times and passed the lower threshold 89 times. The Musharakah indicator value during the period 2004–2020 was 185 times higher than the upper threshold and 0 times lower than the lower threshold. The Murabahah indicator value was 135 times higher than the upper threshold and 0 times higher than the lower threshold. The Istishna Indicator value for the period 2004–2020 was 84 times above the upper threshold and 0 times below the lower threshold. Furthermore, the output generated from the signaling threshold and the in-sample model is used to determine the early warning system for the out-sample model.

TABLE 11
In Sample Model Results

Variables	Upper Threshold Signal		Lower Threshold Signal	
	1	0	1	0
Mudharabah	25	179	89	115
Musharakah	185	19	0	204
Murabahah	135	69	0	204
Istishna	84	120	0	204

Source: Author's calculation

10. Estimating Out Sample Model

The results of assessing true and false signals from stressful episodes tend to make it easier to identify any imbalances that have arisen. Based on TABLE 12, A is indicated as the actual number of imbalance signals; when A appears in a variable, then A shows the variable that emits an imbalance signal, which is followed by a stress episode. B is indicated as a false imbalance signal, which, when it appears, shows a variable that gives an imbalance signal but is not followed by a stress episode, so anticipatory action is needed. C is indicated as the number of false balance signals, which indicates that no signal is issued but it is followed by a stress episode (a stress episode occurs), so mitigation measures are needed. D is indicated as the number of true balance signals, which indicates no signal is emitted and is not followed by a stress episode. Thus, to optimize the value of each variable, the number of errors B and C needs to be minimized.

TABLE 12
The Assessment of True and False Signals of Stress Episode Using a Matrix Crisis-Signal Framework

MUDHARABAH

Time Horizon Upper Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	19	7	34	143	203
3 Month	18	7	31	145	201
6 Month	16	9	30	143	198
12 Month	11	14	29	138	192
24 Month	8	17	24	131	180
Time Horizon Lower Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	61	27	38	77	203
3 Month	60	26	39	76	201
6 Month	58	25	41	74	198
12 Month	56	21	43	72	192
24 Month	48	17	50	65	180

MUSHARAKAH

Time Horizon Upper Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	122	63	5	203	203
3 Month	120	65	4	201	201
6 Month	119	66	2	198	198
12 Month	116	69	1	192	192
24 Month	110	70	0	180	180
Time Horizon Lower Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	0	0	21	182	203
3 Month	0	0	21	180	201
6 Month	0	0	21	177	198
12 Month	0	0	20	172	192
24 Month	0	0	18	162	180

MURABAHAH

Time Horizon Upper Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	107	28	27	41	203
3 Month	105	28	28	40	201
6 Month	102	29	28	39	198
12 Month	98	33	26	35	192
24 Month	94	37	21	28	180
Time Horizon Lower Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	0	0	32	171	203
3 Month	0	0	31	170	201
6 Month	0	0	31	167	198
12 Month	0	0	20	172	192
24 Month	0	0	28	152	180

ISTISHNA

Time Horizon Upper Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	60	24	48	71	203
3 Month	59	25	49	68	201
6 Month	58	26	47	67	198
12 Month	53	28	49	62	192
24 Month	47	22	54	57	180
Time Horizon Lower Threshold	A (Number of true imbalance signals)	B (Number of false imbalance signals – anticipate)	C (Number of false balance signals – mitigation)	D (Number of true balance signals)	N (Total)
1 Month	0	0	64	139	203
3 Month	0	0	63	138	201
6 Month	0	0	63	135	198
12 Month	0	0	60	132	192
24 Month	0	0	50	130	180

Source: Author's calculation

11. Summarizing Out Sample Performance

The quality of indicators is the basis for determining their strengths and weaknesses. The selected data must be able to maximize the quality of the final result as a whole. Therefore, the following is a summary of the conditions of Islamic bank financing indicators for optimizing Islamic banking operations.

TABLE 13
The Summary Conditions of the Financing Indicators for Optimizing the Operational of Islamic Bank

No	Characteristic of Financing Product Indicators		
	Optimal Performance	Non-Optimal Performance (Tolerance)	Vulnerability
	Financing Product Indicators		
1	Stable Mudharabah	Lower Threshold< Mudharabah<Average	Lower Threshold>Mudharabah>Higher Threshold
2	Stable Musharakah	Lower Threshold< Musharakah<Average	Lower Threshold>Musharakah>Higher Threshold
3	Higher Murabahah	Lower Threshold< Murabahah<Average	Murabahah<Lower Threshold
4	Higher Istishna	Lower Threshold< Istishna<Average	Istishna<Lower Threshold

Source: Author's calculation

Looking at the characteristics of the indicators of Islamic banking financing in TABLE 13, it is necessary to study the quality of the basic data. Based on the previous explanation, the optimal threshold is determined based on four criteria: (i) minimum lost function; (ii) lowest QPS; and (iii) optimal signal horizon with a signal extraction approach using matrix indicators. The signal extracted from the selected indicators can be detected using this approach.

TABLE 14
Lost Function, QPS, and GSB

Upper Treshold	Month (M)	Lost Function (L)	QPS	GSB	Lower Treshold	Month (M)	Lost Function (L)	QPS	GSB
Mudharabah	**24 M**	0,1096	0,7778	0,0672	**Mudharabah**	**24 M**	0,1923	1,3778	0,0040
Musharakah	**1 M**	0,4583	1,3202	0,1577	**Musharakah**	**24 M**	0,0000	0,4889	0,0299
Murabahah	**6 M**	0,3408	1,0707	0,0001	**Murabahah**	**3 M**	0,0000	0,6169	0,0476
Istishna	**24 M**	0,1932	1,4444	0,0178	**Istishna**	**24**	0,0000	1,1111	0,1543
Composite Index	**3 M**	0,3378	1,0149	0,0000	**Composite Index**	**1 M**	0,0000	0,3744	0,0175

Source: Author's calculation

Based on TABLE 14, the performance under different criteria and time horizons indicates the most appropriate forecast period that can be used to see the movement of related variables towards optimal financing.

12. Determining the Optimal Level in Index Value

The optimal level reflects the best level of Islamic banking financing. Optimal financing can be achieved if the performance of the variable exceeds the average performance or is in accordance with the predetermined threshold, considering that each related variable has its own uniqueness and different characteristics.

TABLE 15
Optimal Level in Index Value

No	Indicator	Optimal Performance	Non-Optimal Performance	Vulnerability
		Financing Product Indicators		
1	Mudharabah	Mudharabah<0,59	-2,39<Mudharabah<-0,44	-2,39>Mudharabah>0,59
2	Musharakah	Musharakah<3,59	-0,27<Musharakah<1,69	-0,27>Musharakah>3,59
3	Murabahah	Murabahah>5,23	-0,03<Murabahah<2,64	Murabahah<-0,03
4	Istishna	Istishna>2,56	-1,20<Istishna<0,68	Istishna<-1,20

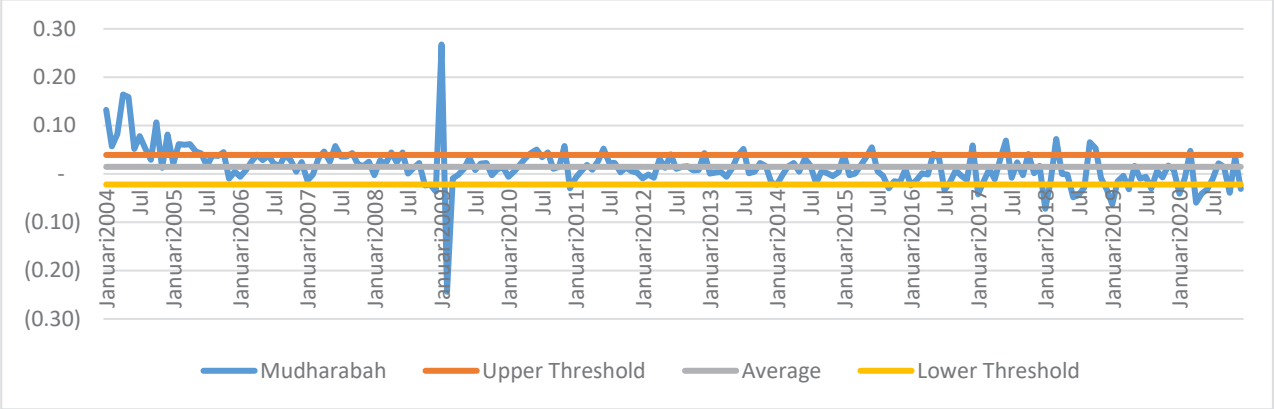
Source: Author's calculation

TABLE 15 shows the best performance on the financing indicator based on the index value. This is the final step of modeling before it is converted into the original data. There are three conditions in the movement of the financing indicators: optimal performance, non-optimal performance, and vulnerability. Each financing has different characteristics, so there are differences in determining the level of vulnerability. PLS (profit-loss sharing) financing is categorized as a risky business, so this type of financing must be maintained at the optimal level, while non-PLS (non-profit-loss sharing) financing offers low risk, so for optimization purposes, this type of financing can be increased beyond the optimal level. In this case, the condition of vulnerability needs to be considered because it is a factor that can raise risks and attack Islamic banking operations.

13. Determining the Optimal Level of Real Value

The transformation of index data into original data is important to determine in absolute numbers the value of each variable in the calculated time range. The resulting output shows the absolute value and threshold. The data that has been converted into absolute values is compared with the average value and upper and lower thresholds to assess the condition of the related variables, whether they are at a vulnerability level, non-optimal performance, or optimal performance.

a. Mudharabah

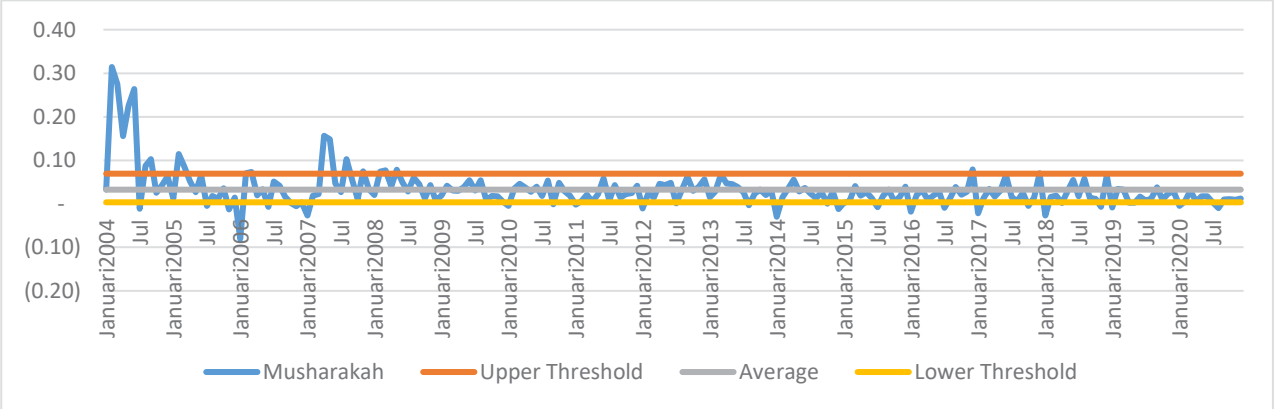


Source: Author's calculation

FIGURE 2
Optimal Level of Mudharabah Financing

Based on FIGURE 2, the expected optimal value ranges from 1% to 4%. The tolerance limit (non-optimal performance) ranges from -2% to 1%. This limit needs to be optimized to reach a value of 4%. Mudharabah financing will experience shocks if the growth falls below -2% and exceeds the optimal threshold of 4%. This is considering that Mudharabah financing is a risky business that is prone to risk, so it must be maintained at the optimal threshold.

b. Musharakah



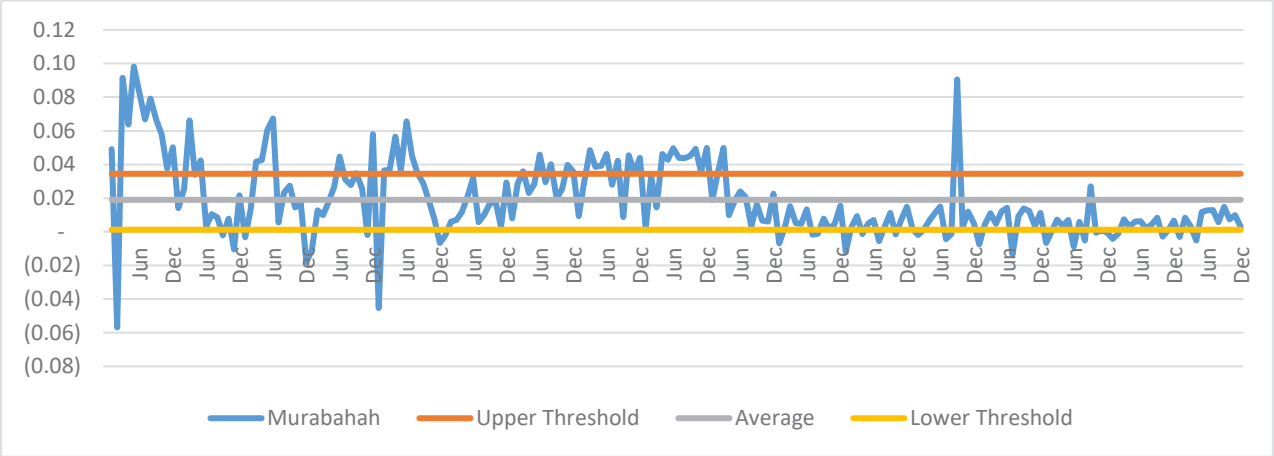
Source: Author's calculation

FIGURE 3
Optimal Level of Musharakah Financing

Based on FIGURE 3, the expected optimal value is in the range of 3% to 6%. The tolerance limit ranges from 0% to 3%; this limit can still be optimized to reach its optimal threshold value of 6%. Musharakah financing will experience

shocks if it is below 0% and above the optimal level of 6%. Similar to Mudharabah financing Musharakah financing must be at its optimal level because this financing is categorized as a risky business that is prone to risk. Thus, the composition of Musharakah financing is expected to be maintained at an optimal threshold, not too high or too low, in order to avoid the possibility of major risks.

c. Murabahah

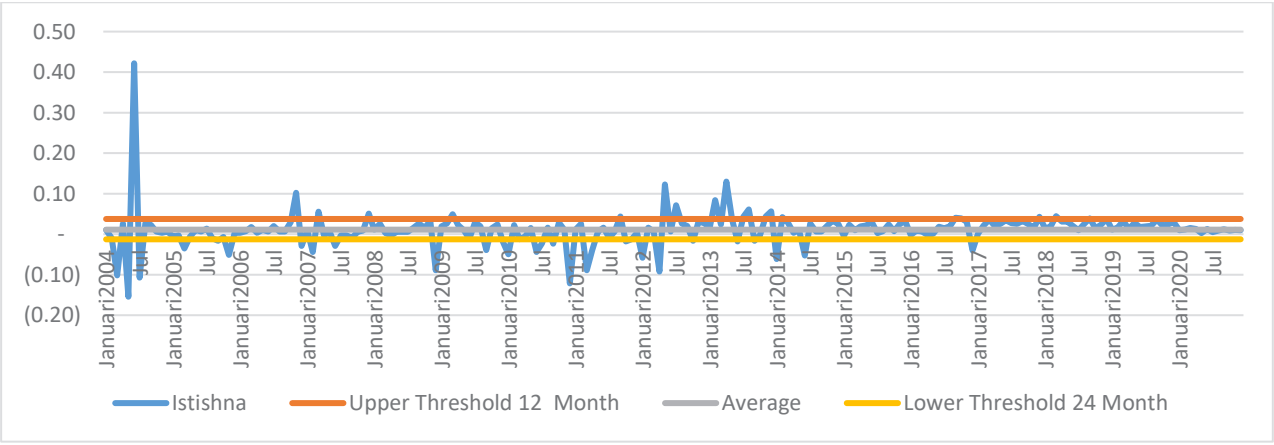


Source: Author's calculation

FIGURE 4
Optimal Level of Murabahah Financing

Based on FIGURE 4, the expected optimal value ranges from 2% to 3.6%. Murabahah financing tolerance limits range from 0% to 2%. Shocks can occur if the Murabahah value is below 0%. Murabahah financing can still be optimized until it reaches its optimal threshold, considering that the income received by the bank has low risk of loss.

d. Istishna



Source: Author's calculation

FIGURE 5
Optimal Level of Istishna Financing

Based on FIGURE 5, the expected optimal value ranges from 1% to 3,7% but can still be optimized again until it is above the optimal limit. This financing tolerance limit ranges from -1% to 1. Shocks can arise if Istishna's financing is below -1%. Istishna can be increased beyond the optimal threshold considering the low-risk level of Istishna financing and easy management.

14. Setting the Heat Map

TABLE 16
Heat Map Summary

	Optimal Performance				Not Optimal Performance				Vulnerability			
Years	Mudharabah	Musharakah	Murabahah	Istishna	Mudharabah	Musharakah	Murabahah	Istishna	Mudharabah	Musharakah	Murabahah	Istishna
2004	1	3	11	4	1	1	0	5	10	8	1	3
2005	4	3	5	1	2	5	5	8	6	4	2	3
2006	8	3	6	4	3	2	4	7	1	7	2	1
2007	7	2	7	2	2	5	3	8	3	5	2	2
2008	4	5	8	6	3	4	2	5	5	3	2	1
2009	3	4	3	8	7	8	8	2	2	0	1	2
2010	3	6	11	4	4	4	1	3	5	2	0	5
2011	4	3	10	4	7	8	2	5	1	1	0	3
2012	2	7	10	7	8	3	2	2	2	2	0	3
2013	3	5	5	9	8	5	7	1	1	1	0	2
2014	4	3	0	6	7	6	9	4	1	3	3	2
2015	2	3	0	7	7	7	8	5	3	2	4	0
2016	1	1	1	6	7	8	6	5	4	3	4	1
2017	3	2	0	11	6	7	10	1	3	3	2	0
2018	0	2	1	11	3	5	4	1	9	3	7	0
2019	2	2	0	12	7	7	8	0	3	3	4	0
2020	3	0	0	5	2	9	10	7	7	3	2	0

Source: Author’s calculation

Based on TABLE 16, the contribution of variables is divided into three conditions: optimal performance, non-optimal performance, and vulnerability. Mudharabah is a variable that experienced the most shocks during the period 2004–2020. Murabahah and Istishna are variables that often contribute to banking operating income, while the Musharakah variable is a variable that is still at the tolerable threshold. To contribute to optimize the operational performance of Islamic banking, Musharakah needs to control its financing to an optimal level, considering the importance of Musharakah as a source of financing that can bring high returns.

In addition, based on TABLE 16, the development of Mudharabah is often outside the optimal and tolerable limits. Therefore, Mudharabah financing can trigger risks in the Islamic banking sector if it is not handled properly. Mudharabah financing needs to be maintained at the optimal threshold in order to be able to withstand shocks and contribute to increasing profitability.

15. Visualization

Considering the importance of improving the quality of productive assets (financing) to achieve an optimal operational level, TABLE 17 shows several conditions under which Islamic banks operate at optimal, not-optimal, and vulnerability levels. The description of these conditions is expected to have an influence on the optimization of Islamic banking operations based on current financing contract indicators that indicate the emergence of shocks that have a negative impact on the optimization of Islamic banking operations. The presence of the optimal threshold level has an impact on financing optimization, where return can be maximized and the possibility of risk occurring can be minimized.

TABLE 17
The Threshold Level and Its Components

Indicator	Threshold	Time Horizon	Optimal Performance	Not Optimal Performance	Vulnerability
Elements of Composite Index					
Composite Index	Upper Threshold	3	1,37%<CI<2,72%	.-0,0068%<CI<1,37%	.-0,0068%>CI>2,72%
Composite Index	Lower Threshold	1			
Components Composite Index					
Mudharabah	Upper Threshold	24	1%< Mudharabah < 4%	-2%<Mudharabah <1%	-2%>Mudharabah> 3%
	Lower Threshold	24			
Musharakah	Upper Threshold	1	3%< Musharakah < 6%	0%<Musharakah< 3%	0%>Musharakah> 6%
	Lower Threshold	24			
Murabahah	Upper Threshold	6	2%<Murabahah>3,6%	0%<Murabahah< 2%	Murabahah<0%
	Lower Threshold	3			
Istishna	Upper Threshold	24	1%<Istishna>3,7%	-1%<Istishna<1%	Istishna<-1%
	Lower Threshold	24			

However, the best time horizon for Mudharabah is 24 months; in this case, it is advisable to invest long-term (24 months), considering long-term investment using risky instruments such as profit-sharing financing allows Islamic banks to get high profits from time to time through the business that is run. The best time horizon for Musharakah is 1 month for the upper threshold and 24 months for the lower threshold. In this case, it is advisable to invest in short-term financing when Musharakah is at the upper threshold, considering that Musharakah financing has a very complicated system, so it can be used for short-term financing to invest safely. Musharakah is advised to invest long-term (24 months) when it is at a lower threshold. Murabahah's time horizon is 6 months for upper and 3 months for lower. Murabahah is essentially short-term financing, so the financing instrument is safe. The time horizon for Istishna is 24 months. In this case, Istishna financing is used to finance a project, so it is advisable to use a long-term investment (24 months). Thus, determining the right time horizon is very important and helps in choosing the right financing option to optimize the income earned.

B. Policy Implication

An increase in operational performance can be achieved if Islamic banks can overcome shocks and minimize risks. Considering that Islamic banks financing is vulnerable to risk, it is necessary to improve the quality of productive assets (financing) to enable Islamic banks to generate profits from the selected financings. The financing products distributed to the public will increase the profitability of Islamic banks. Based on TABLE 17, the level of financing growth must be controlled until it reaches the optimal threshold for each financing contract. The financing contracts should not lead to a vulnerability phase, especially Mudharabah and Musharakah financing, which must be maintained at an optimal level considering this financing is categorized as a risky business. Islamic banks must continue to improve the quality of productive assets. This is because productive assets are the largest source of income, which greatly affects the resilience and stability of Islamic banks.

In this case, the optimal conditions referred to by the researcher are: optimal can be achieved if the operational performance of Islamic banking is at its best without having to reach a deadline; the optimal condition referred to by the researcher is a condition in which Islamic banks are able to maximize profits and minimize losses because high income reflects high operational performance; the definition of optimal is when Islamic banking runs its main business without destroying the elements in it; and the optimal condition referred to by the researcher is if Islamic banking succeeds in surviving when there is a shock to the economy.

There are several reasons why optimal limits are so important, such as that the optimal threshold can assist in increasing the profit of Islamic banks considering that the optimal threshold has been adjusted to the characteristics of each financing product; the optimal limit will ensure the level of indicator sustainability; if a shock hits it, the element can prevent risk or minimize risk; the optimal limit can help policymakers measure which indicators are depressed and which are stable because the optimal threshold is able to help policymakers make relevant policies.

V. CONCLUSION

A. Conclusions

Based on the research results, there are 15 (fifteen) steps in determining the optimal level of selected Islamic financing, including developing a theoretical framework, transforming data into an index, selecting a base year, determining weight, index aggregation, utilizing factor analysis, setting thresholds, signaling thresholds, estimating in a sample model, estimating out a sample model, summarizing out a sample model, determining the optimal level in index value, determining the optimal level in real value, setting the heat map, and visualizing. These 15 (fifteen) sequential steps are capable of capturing imbalances and determining the optimal level of each financing, with the result that they are able to assess the potential losses to maintain the resilience and stability of Islamic banks in Indonesia.

Islamic banks need to understand the characteristics of each financing contract to improve the quality of their assets, considering that each financing contract has different characteristics. Then, it is needed to reach the optimal level, which can contribute to maintaining the resilience and stability of Islamic banks. The result shows that the optimal level of mudharabah contract is in the range of 1% to 4%. The optimal level of musharakah contract is in the range of 3% to 6%. The optimal level of murabahah contract is in the range of 2% to 3.6%. The optimal level of istishna contracts is in the range of 1% to 3.7%.

B. Suggestion

It is suggested that the 15 (fifteen) steps be developed in combination with an application that can automatically calculate the optimal level. In addition, the use of applications can avoid human errors in calculations, considering that each step has an important role in determining the final results. Moreover, Policymakers should maintain contract growth at the optimal level in order to maintain the resilience and stability of Islamic banks in Indonesia.

C. Research Limitations

Due to the phase of complexity associated with systemic events, this study focuses only on the following limitations: focus on Islamic banking in Indonesia; the data used is based on data from Islamic Commercial Banks and Sharia Business Units, not on data from each bank; research has not reached macroeconomic indicators; data is not based on book bank grouping; the focus of data is only limited to the Mudharabah, Musharakah, Murabahah, and Istishna variables due to data limitations on variables outside the variables in this study; and the study period ranges from 2004–2020, monthly.

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