CHAPTER III

DATA AND RESEARCH METHODOLOGY

A. Research Objective and Data Type

The objective of this research is The Impact of Selected Macroeconomic Variable towards the resilience of Islamic Banking in Indonesia. Based on how to obtain the data, the type of data in this research are secondary quarterly time series data starting from first quarter 2010 to last quarter 2017. The usage of quarterly data based on technical statistic consideration related to limitation of publication, while the selection time period from 2010 until 2017 based on the new phase of new normal of global economy where the global economy start to increase after its recession indicated by the growth of east Asian country and China economy. This new normal occurs after one cycle of business cycle (expansion, peak, recession, through, and recovery phase). It is also based on 3 constructive years after the period after being issued Act of The Republic Indonesia Number 21 of 2008 concerning Islamic banking in Indonesia where the policy and government action for Islamic banking has been obtaining the results. The data obtained from Statistic Perbankan Syariah (SPS) Otoritas Jasa Keuangan (OJK), monthly report from Statistik Ekonomi Keuangan Indonesia (SEKI) Bank Indonesia (BI), World Bank Data, Badan Pusat Statistik (BPS) and other available resources.

This research used 7 variables; the detail of the variable is 4 variables as the independent variables (the selected macroeconomic variables) and the dependent

variable is the resilience variable index that constructed through 3 micro-banking indicators.

The dependent variable is the resilience variable index that constructed through 3 micro-banking indicators; Return on Assets (ROA), Capital Adequacy Ratio (CAR), and Third Party Fund (DPK). Meanwhile, the independent variables are the selected macroeconomic variables, they are: gross domestic product (GDP), Exchange Rate (ER), Inflation Rate (INF).

The use of the independent variables in this research is based on the previous researches that have been conducted by many researcher and literature. One of the research that is conducted by Makram Nouaili et. al (2015), according to Nouaili (2015) the banking performace can be analyzed by seeing several variable from internal determinants (specific to banks) and external variables (macro-economic and macro-financial) which reflect the economic and legal environment in which the bank operates gross domestic product (GDP), Exchange Rate (ER), Inflation Rate (INF), meanwhile, Return on Assets (ROA), Capital Adequacy Ratio (CAR), and Third Party Fund (DPK) are the variables which represented the 3 group mentioned by Makram Nuoaili (2015), the 3 group variable from internal determinants (specific to banks) and external variables (macro-economic and macro-financial).

B. Data Collection Method and Sources

The data are collected from several credible resources in Indonesia and International. This study also obtains relevant information from many articles, books, journals, newspaper and others used as the reference.

TABLE 3.1

Variable and Data Source

NO	Variable	Definition	Sources
1	**GDP** (Gross Domestic Product)	Gross Domestic Product by Expenditure in Constant Prices: Total Gross Domestic Product for Indonesia, Index 2010=100, Quarterly, Seasonally Adjusted	Federal Reserve Bank of ST. Louis https://fred.stlouisfed.org/tags/series?t=gdp%3Bindonesia%3Bquarterly
2	**INF** (Inflation Rate)	Inflation rate based on Consumer Price Index (CPI), quarterly data Jan 2010-December 2017 (2012=100) base year	Central Bureau of Statistic (BPS) in Indonesia https://www.neliti.com/publications/51558/monthly-indonesia-consumers-price-and-inflation-2005-2017
3	**ER** (Exchange Rate)	Nominal exchange rate on transaction adjusted price, Indonesian Rupiah IDR compared to USD	Bank Indonesia (BI) https://www.bi.go.id/en/moneter/informasi-kurs/transaksi-bi/Default.aspx
5	**CAR** (Capital Adequacy Ratio)	CAR percentage of Sharia Commercial Bank, Jan 2010-December 2017 quarterly data	Indonesian Financial Service Authority, (OJK) https://www.ojk.go.id/id/kanal/syariah/data-dan-statistik/statistik-perbankan-syariah/default.aspx
6	**ROA** (Return on Assets)	ROA percentage of Sharia Commercial Bank, Jan 2010-December 2017 quarterly data	Otoritas Jasa Keuangan (OJK), Indonesian Financial Service Authority , https://www.ojk.go.id/id/kanal/syariah/data-dan-statistik/statistik-perbankan-syariah/default.aspx

NO	Variable	Definition	Sources
7	**DPK** (Dana Pihak Ketiga / Third Party Funds)	DPK of Sharia Commercial Bank, Jan 2010-December 2017 quarterly data, Million Rupiah	Otoritas Jasa Keuangan (OJK), Indonesian Financial Service Authority , https://www.ojk.go.id/id/kanal/syariah/data-dan-statistik/statistik-perbankan-syariah/default.aspx

C. Operational Definition of Researched Variables

The operational definition is used in order to avoid mistakes in interpreting the data. This research used 7 variables. The detail of variables as follows:

1) Dependent Variable

a) The Resilience Index of Islamic Banking as the Dependent variable

The dependent variable in this study is the resilience index of Islamic banking. An index is composite measure of variables, or a way of measuring a construct using more than one data item. The composite index namely resilience index is constructed by 3 internal Islamic banking Indicators. They are; CAR, ROA, and DPK. In this study, The 3 indicators of internal banking are chosen to represent the performance or resilient level in Islamic banking. ROA indicates the profitability of Islamic banks, CAR relates to a bank's capital. It is expressed as a percentage of a bank's risk weighted credit exposure, while DPK correlates to liquidity and main source of operation.

1. Capital Adequacy Ratio (CAR) is a measurement of a bank's capital. It is expressed as a percentage of a bank's risk weighted credit exposure. The data of CAR variable in this research is quarter time series data from 2010 – 2017 of Islamic commercial banking in Indonesia. The data is obtained through the average of 3 constructed monthly data to become quarterly data in percentage form. The source of the data is from Indonesian Financial Service Authority.

2. Return on Assets (ROA) is a financial ratio that shows the percentage of profit a company earns in relation to its overall resources. The data of ROA variable in this research is quarter time series data from 2010 – 2017 of Islamic commercial banking in Indonesia. The data is obtained through the average of 3 constructed monthly data to become quarterly data in percentage form. The source of the data is from Indonesian Financial Service Authority.

3. Third Party Fund (DPK) is the measurement of amount of fund that is obtained from the depositor and other parties in bank. The data of DPK variable in this research is quarter time series data from 2010 – 2017 of Islamic commercial banking in Indonesia. The data is obtained through the average of 3 constructed monthly data to become quarterly data in million (IDR). The source of the data is from Indonesian Financial Service Authority.

2) The Independent Variables

The independent variable in this study is the selected macroeconomic variable. The selected macroeconomic variables will be constructed into single index. The selected macroeconomic variables as follows:

4. Gross Domestic Product (GDP) in this research used gross domestic product by expenditure in constant price seasonally adjusted based on 2010 base year (2010=100) in quarterly time series data from 2010 – 2017 in Indonesia. This data is obtained from Federal Reserve Bank of S.T. Louis.

5. Inflation Rate (INF) in this research is calculated through consumer price index based on 2007 base year (2007=100) quarterly time series (year to year) data from 2010 – 2017 in Indonesia. This data is obtained from Central Bureau of Statistic (BPS) in Indonesia.

6. Exchange Rate (ER) in this research is nominal exchange rate on transaction adjusted price in Indonesian Rupiah IDR compared to USD monthly data is averaged into quarter data from 2010 – 2017. This data is obtained from Yahoo finance and Bank Indonesia.

D. Research Model and Analysis Method

To complete this study and obtain the result, this study used Microsoft excel as the auxiliary tool to construct the vulnerability index as the dependent variable and the single index of each selected macroeconomic variable as the independent variable. Multiple Linear Regression Ordinary Least Square (OLS) as statistical

approach to identify the influence of the independent variable (the selected macroeconomic variables) towards the dependent variable (resilience index of Islamic banking).

1. Indexation

In this study indexation by standardization method is used to develop or construct the single index and composite index. The resilience index (Composite Index) is constructed from 3 index internal variable of Islamic banking, Return on Assets (ROA), Capital Adequacy Ratio (CAR), and Third Party Fund (DPK). This resilience index is set as the dependent variable, while the independent variables are the single index of each macroeconomic variable.

2. Constructing Resilience Index as The Dependent Variable

a) Item Selection

The first time in creating an index (resilience index) is selecting the items that wish to include in the index to measure the variable of interest (Organization for Economic Co-Operation and Development, 2008). In this study, the selected items are CAR, ROA, and DPK as they are the internal indicator in Islamic banking that represent the performance and resilience.

b) Examining Empirical Relationship

The second step in index constructing is to examine the empirical relationships among the item that wish to include in the index. An empirical relationship is when respondents' answer to one question will predict how they

will answer the other question (Organization for Economic Co-Operation and Development, 2008).

c) Calculating the Composite Index

The composite index is an index that contains more than one single index of selected Item. To obtain the composite index, the single index is needed to obtain (Organization for Economic Co-Operation and Development, 2008). Here is the formula for the single index:

$$SI_t = \frac{X_t^j - \bar{X}}{\sigma}$$ ..………………………………………………………….. (1)

Where:

SI_t : Single Index at period t

X_t^j : Variable (Quarterly)

$\bar{X}$: Average of Variable during the research period

σ : Standard Deviation per variable during research period

Then, the composite index can be constructed by added the entire Single index (SI_t) into composite index.

(0,3 x SI ROA) + (0,3 x SI CAR) + (0,3 x SI DPK) = Resilience Index …........ (2)

In constructing the composite index, every single index is given the same weight because all the selected variables has the same influence and each variable is important. According to the "Handbook on Constructing Composite Index" by Organization for Economic Co-operation and Development (2008) about

constructing the composite index, most composite indicators rely on equal weighting (EW), all variables are given the same weight. This essentially implies that all variable are worth the same in the composite.

d) Setting The Threshold

The availability of threshold shows the fluctuation of each index is in normal level or beyond the normal level. The formula to set the threshold as follows:

$$T = \bar{X} + M \times \sigma X \text{ (Single Index)} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (3)}$$

$$T = \overline{IC} + M \times \sigma IC \text{ (Composite Index)} \dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (4)}$$

Where;

T   : Threshold

$\bar{X}$: Average of Variable during the Research Period

M   : Multiplier (1,3, 1,7, 2 are Used in This Study)

σIC : Standard Deviation from Composite Index

σX : Standard Deviation from Variable X

After selecting and calculating the threshold, then combining the each index with the threshold in one graph aims to see easily the index whether the index is in normal level or beyond the set 3 thresholds (1,3, 1,7, and 2). The Threshold 1,3 represents the alert threshold, threshold 1,7 represents the wary threshold, and the threshold 2 represents the crisis threshold. The smallest the value of index is the index below the set threshold then it is can be said as normal level. These 3 selected thresholds refer to the threshold used by Bank Indonesia.

3. Single Index of Each Macroeconomic Variable to Figure the Condition of Each Variable

The single index is able to show and figure the fluctuation of each selected variable during the time period by setting threshold for the index through the standard deviation. The fluctuation of macroeconomic has become one of the causes of the imbalances in financial system. The indexation is constructed to see how far the fluctuation of the selected macroeconomic variable during the researched period. The selected macroeconomic variables will be constructed to the single index variable.

4. Multiple Linear Regression Method

The purpose of multiple linear regression method that used in this research is to identify the influence of the independent variable (the selected macroeconomic variables) towards the dependent variable (resilience index). Every value of independent variable is associated with the value of the dependent variable. The multiple linear regression is one the regression analysis in data analysis which attempt to model the relationship between two or more explanatory variables and a response variable by fitting a linear equation to observe data. This study uses this following econometric model:

$$RI_t = a + \beta_1 \, SIGDP_t + \beta_2 \, SIER_t + \beta_3 \, SIINF_t + e \dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(5)}$$

Where:

Y   = Resilience Index of Islamic Banking

a   = Constanta

$\beta_1 - \beta_3$ = Regression Coefficient of Each Variable

SIGDP   = Single index of Gross Domestic Product

SIER   = Single Index of Exchange Rate

SIINF   = Single Index of Inflation Rate

Accordance to Dimitrious (2007) assumptions of the multiple regression model are as follows:

1) The dependent variable is a linear function of the explanatory variables.

2) All explanatory variables are non-random.

3) The variance of error is constant (heteroscedasticity).

4) There is no autocorrelation in error.

5) There is no multicollinearity in independent variables.

6) Each u_t or Error normally distributed.

7) There are no exact linear relationships among the sample values of any two or more of the explanatory variables.

5. Regression Analysis

1) Coefficient of Determination (R-Squared)

The coefficient of determination (R^2) is used to measure how far the ability of the model in explaining the variation of the dependent variable. In analyzing used Adjusted R^2 value. Adjusted R^2 value is $0 <$ Adjusted $R^2 < 1$. Adjusted value of R^2

is small close to 0 means the ability of variable of independent variable to explain variation of dependent variable is very limited. If the value of Adjusted R^2 is large or close to 1, it means the ability of an independent variable can provide more measurable information to predict the dependent variable (Dimitrious & Stephen, 2007).

2) Simultaneous Regression Model Testing (F-Test)

F-test can evaluate the influence of more than one independent variable or can be said all independent variables to dependent variable. It is different from t-test which is only evaluating partial independent variable to dependent variable. The result from F-test can be different from t-test, for example, in t-test the crude oil price has no impact on vulnerability of Islamic bank, but crude oil price and global gross domestic product when they are grouped shows to the different result. (Widarjono, 2017).

The hypothesis test by is using F-test as follows:

Ho : all the variable independents are simultaneously explanatory which are significant against the dependent variable.

Ha : all the independent variables are not simultaneously explanatory which are significant against the dependent variable.

With criteria as follows:

If P value <0,05 then Ho is rejected, and if P value >0,05 then Ho accepted

3) Partial Regression Coefficient Testing (t-Test)

t-Test statistic is a partial test, where the test is used to test how good the independent variables can explain the dependent variable individually. At the 0.05 (5%) significance level, assuming the independent variable has a constant value.

Hypothesis:

If the probability $\beta i > 0.05$ Not significant

If the probability $\beta i < 0.05$ Significant

Ho   : an independent variable is not explanatory variable which is significant to the dependent variable

Ha   : an independent variable is explanatory variable which is significant against the dependent variable

6. Classical Assumption

The classical assumption test is used in this study to obtain the regression result with the BLUE characteristic (Best Linear Unbiased Estimator).

1) Autocorrelation Test

Literally, autocorrelation means that there is a correlation between one observation part and another different time observation. Detecting the presence of Autocorrelation is very important in multiple regression, because when a

researcher has applied ordinary least square over an estimator in the presence of autocorrelation, then the estimator is incompetent (Widarjono, 2017).

2) Multicollinearity Test

This test aims to see if it is in regression mode found a high correlation between independent variables. A good regression model is characterized by there is no correlated independent variables is being used. To detect the presence or absence of Multicollinearity in the regression model is by looking at the Variance Inflation Factor (VIF) by the equation VIF = 1 / tolerance. If VIF is less than 10 then there is no multicollinearity (Widarjono, 2017).

Multicollinearity is useful to test the regression model whether it has correlation among independent variables or not. Multicolinearity can be detected by seeing the coefficient value of independent variables in the matrix result. A good regression model is free from multicollinearity between independent variables and dependent variable (Gujarati, 2007).

3) Heteroskedasticity Test

The heteroskedasticity test aims to see if there is inequality variance from residual of one other fixed or homoskedasticity observation. Heteroskedasticity is the regression problem that does not have the same variant or variants not constant. This leads to various problems that the OLS estimator is biased, the variance of the OLS coefficient would be wrong (Basuki & Yuliadi, 2014). If the result of probability value has significant value α> 0,05 then the model does not contain heteroskedasticity.