A PRELIMINARY STUDY ON CONSTRUCTING SHARIA BANKING RESILIENCE (SHABAR) INDEX IN INDONESIA

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ABSTRACT

Given the fact that financial crisis, as manifestation form of the financial instability, becomes more frequent, complex and severe, it is importance to examine various tools that can monitor resilience of financial institution especially banking system that has significant role in economy of a country. Though Islamic banking operates within the similar financial environment, its fundamental differences call for different treatment in building resilience. The existing literature on banking surveillance tools is either mostly for banking in general or is dominated by partial development. Hence, there is significant gap in the literature to address the specificities of Islamic banking and comprehensive banking surveillance tools analysis to build resilience that can contribute to financial stability in a country. This study explores this gap in case of Indonesia. The study notes that optimum resilience level of sharia banking in Indonesia exist in spesific range as the result of contribution every single indikator build it. Moreover the study makes possible for tracking of which indicator contribute to the instability of sharia banking system in Indonesia.

***Keywords** : Sharia Banking Resilience Index, Islamic Banking, Risk Management, Indonesia*

I. INTRODUCTION

Islam has special characteristic as a religion as well as a way of life, while it is not only comprehensive but also universal. Comprehensive means Islamic Shariah summarizes all aspects of life, both ritual (worship) and social (muamalah). Universal Islamic syariah meaning can be applied in any time and place until the end of the day. This universality is particularly evident in the field of muamalah. Besides being broad and flexible, muamalah does not discriminate between Muslims and non-Muslims, where in the field of muamalah, non-Muslims obligations are our obligation as well as Muslims, and non-Muslims right is also our right (Sayyidina Ali, hadith).

Islamic economic system is a part of Muslim's life in an effort to implement the teachings of Islam in economic activity. Yuliadi (2007) said that this system is an important aspect of an integral and comprehensive Islamic system to create a better human life. Alignment and balance between the horizontal and vertical aspects can guarantee the human's lives of and the universe to walk in harmony and continuous prosperity to the world of the hereafter. By applying the system automatically we can fix unanswerable questions in economy as well as in our life.

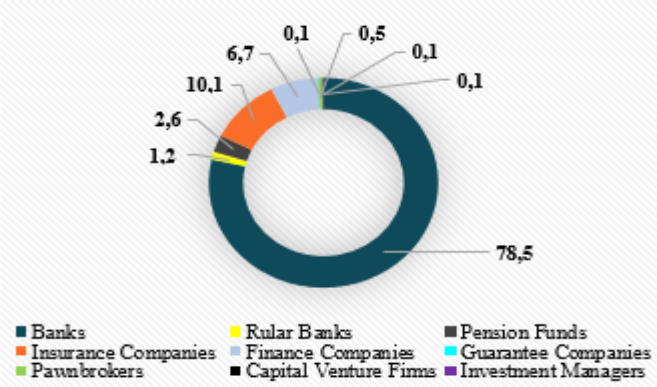
The absence of sharia well-managemnet application in economics system can invite such financial crisis in the late of 1990s, perhaps, it is because suppose basic

prohibition interest invited money creation, *gharar*, *maysir* in secondary market cannot be avoided. It happened as Asian financial crisis of 1997-1998 spent extraordinary cost to countries for bailing out banks as much as 55% of GDP.[1] This does not include the cost to depositors and borrowers of wider interest rate spreads from bad loan of balance sheets that can push down economic growth of countries involved.

Therefore, financial stability and resilience have been taking place and become interesting phenomena in developing as well as developed countries, which particularly come along with new alternative solution, islamic economics and finance.

Following that issue, several international forums devoted to provide crisis prevention such as World Bank and International Monetary Fund (IMF) by introducing The Financial Sector Assessment Program (FSAP) in 1999, Basel Committee on Banking and Supervision, Islamic Financial Service Board (IFSB), Financial Stability Forum, International Association of Insurance Supervisors, and International Accounting Standard Board. Generally, the aim of those forum is to assess regularly the strength and weaknesses of financial systems to enhance financial stability.

The case study from Indonesia shows that this country is categorized as bank backed asset, because more than 70% of the asset in financial institution dominated by banking. (figure 1.2) According to Basurto and Padilla (2006), a strong and good financial system is a key for macroeconomic stability in term of supporting savings and efficiency in allocating resources and investment opportunities. Hence, it is important to conduct surveilance as prior step to catch up financial system stability. According to Bank Indonesia, the resilience of financial system can be defined through several condition, as follows (i) When financial system is able to allocate resources and to absorb shock occurs, which can prevent surprises in the real sector, (ii) When financial system is still capable of running intermediation function, execute payments and redistribute risk properly if there is interference with the economy and (iii) When price decision, allocation of funds and the risk management in financial system are running well and supporting economic growth.



Source: Islamic Financial Services Authority (OJK), 2016

FIGURE 1.2

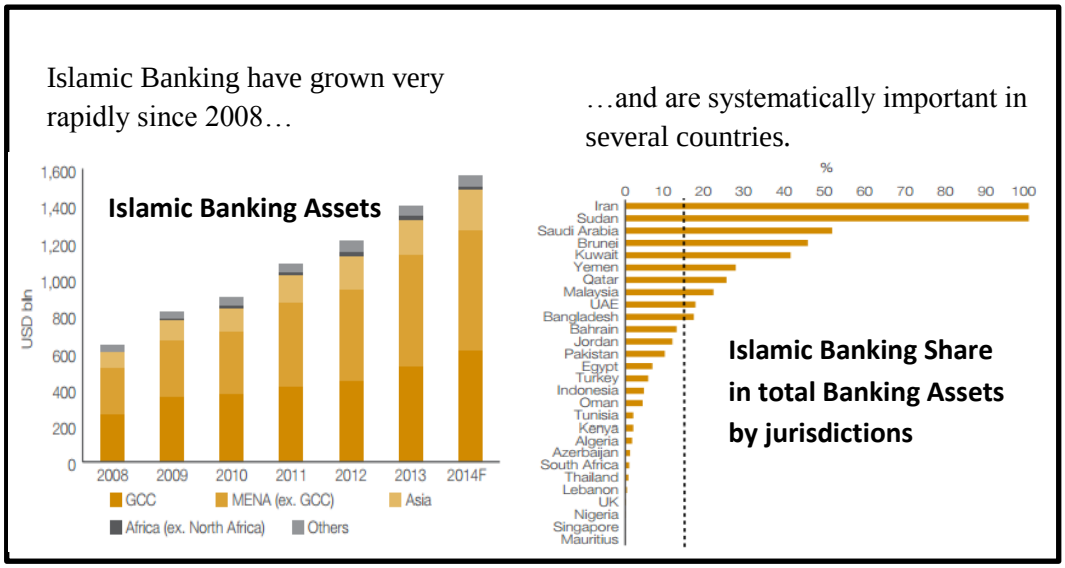
Asset Composition of Financial Institutions on December, 2016

The stability of the financial system itself cannot be achieved without the depth understanding to any components inside the system. The financial system consists of a number of financial institutions, a set of financial markets, the financial system infrastructure, and a number of procedures and rules that guarantee the savings and loan running well, where financial system stability cannot be separated from financial institutions soundness and financial market stability. Banking is one important part in supporting financial system stability. A strong banking system and resilience of banking system is the foundation for sustainable economic growth, as banks are at the center of the credit intermediation process between savers and investors. (BIS, 2009) the existence of both banks individually and the entire system is a requirement for sustainable economic growth.

[1] Caprio and Klingebiel 2003 in World Development Indicator, 2009.

Islamic finance, with banking system inside, is one of the fastest growing segments of the global financial industry. In some countries, it has become systematically important, and in many others, it is big to be ignored. Though, Islamic finance encompasses banking, insurance, leasing, investment funds, micro finance, *Sukuk* and equity. Their assets mainly come from banking and *Sukuk* represent about 95% of total Islamic finance assets. It is estimated that the sized of Islamic banking industry at global level was closed to $882 billion at the end of 2014 with average growth rate of 14% per year between 2010-2014.[2] This is about two to three times faster than the rate at which conventional bank grew over the same period, due in part to the global financial crisis.

Banks. One of well-known tools is Capital-Management-Earnings-liquidity-Sensitivity (CAMELS) rating system that generally appropriate, but it still less adapted to the specific risks adapted by IB, particularly regarding sharia compliance, capital adequacy, asset quality, and liquidity. Moreover, present literature use partial Islamic Banking (IB) soundness variables, by using (Non Performing Financing) NPF, (Capital Adequacy Ratio) CAR, (Return on Asset) ROA to gain understanding about IB resilience. Gunadi (2013) provided comprehensive understanding about banking resilience even financial system stability by using Financial System Stability Index (FSSI). However, the discussion has been centered toward assessing the banking



Source: Islamic Financial Service Industry Stability Report, IFSB *2015*

FIGURE 1.1
The growing Importance of Islamic Banks

Despite this development of Islamic Banking, it is notable that the literature focusing on micro prudential surveillance apply comprehensive resilience-based supervision is still requires. Generally, Surveillance authorities apply either macro prudential or generic surveillance framework procedure for (Institutions offering islamic financial services) IIFS and Conventional resilience and stability rather than specific for IIFS and micro prudential perspective.

Islamic banking differs from conventional banking in several ways. Conventional Banks (CBs) intermediation is largely debt-based with pre-specified interest rate and allows for risk transfer, while IIFS (IB) intermediation is assets based and centers on risk sharing (Mejía, 2014). In

[2] World Islamic Competitiveness Report, EY, 2016

running sale and lease contract, IIFS must have an underlying asset. It makes IIFS more resilient during the global financial crisis compare to its counterpart.

Recent theoretical study (Yazdan Gudarzi Farahani, 2012) found positive and significant relationship between Islamic banking development and economic growth. While the expansion of Islamic bank is expected to support growth, it is still stances challenges in term of competition, size, standardization and regulation, and cost structure. Standardization and regulation of IB is one of potential challenge to be explored, as it can make effective surveillance and give direction for authorities as well as institution itself to promote stability and resilience that can contribute to economic growth. Moreover, the urge of tool for IB to do supervision and surveillance is categorized as strategic issue in the development of IB in Indonesia.[3]

Recently, composite indicators (CIs) which compare country performance are increasingly recognised as a useful tool in policy analysis and public communication. The number of CIs in existence around the world is growing year after year in academic circles, the media and among policymakers (Bandura, 2006, which cites more than 160 composite indicators). Such composite indicators provide simple illustration of complex and sometimes elusive issues in wide-ranging fields, e.g., environment, economy, society or technological development. This can be used not only in macro level, but also in micro level, such as bank. It is quite rare for IB having tool such as internal composite Index compare to CB.

According to the description above, this study attempts to fill the gap in term of the lack of comprehensive tools for IB to enhance resilience. Analyzing Islamic banking resilience supervision in Indonesia is interesting effort, as this country is the biggest Muslim population in the world and has complete periodical economic situation. This economic situation refers to normal, recession, and crisis in the last two decades.

Hence, this study, entitled "**A Preliminary Research on Constructing Sharia Banking Resilience (SHABAR) Index in Indonesia,**" is going to provide tools as a surveillance the resilience of IB in Indonesia. This study uses a constructed Index to supervise resilience of Islamic banking in Indonesia. The data used is high-frequency data (monthly data) reflect the behavior of the financial institution, particularly IB. This study has adapted the specific characteristics of sharia banking intermediation that is assets based and centers on risk sharing. Methodology used is normalization of indices pre-and post-year by comparing current related variabel of idyosyncratic risk in banking with pre-and post-year. The proportion of every Index forming financial institutions assumed to be equal.

This study will contain several chapters as follows: Chapter 1 provides background and introduction of this study. Chapter 2 covers literature review of Composite Indicators (CI) formation any indicator related to stability of financial institution. Chapter 3 explains the data selected, steps for constructing SHABAR index, and construction model of SHABAR index. Chapter 4 analyses the result of SHABAR index formation, discusses the implications and key issue in building IB resilience sensitivity analysis of each indicator on the Index, and future Index projection. Chapter 5 concludes and offers a way forward for SHABAR Index studies followed by appendix.

The study limits the analysis problem Focused on (i) All IBs[4] listed in website of Bank Indonesia after enactment Act Number 21 of 2008, (ii) The data spans

[3] Roadmap perbankan syariah Indonesia, 2015-2019

[4] Institutions offering Islamic Fiinancial Services, Analog with Islamic Banking

from Januari 2010 to December 2016, monthly time series data, (iii) Indicators used to build Sharia Banking Resilience (SHABAR) Index based on Trinity of Financial System Stability from Bank Indonesia, (iv) indices Constructing Resilience are related to idiosyncratic risk of Sharia Banking (Micro Level)

This study has three research questions which are going to be solved, as follows:

1. How to construct an Index for monitoring the resilience of Islamic banking in Indonesia?
2. To what extent does the resilience of Islamic banking in Indonesia?
3. How does each indicator of Index contribute to the resilience of Islamic banking in Indonesia?

II. METHODOLOGY

A. Research Variable and Data Type

Sharia Banking Resilience (SHABAR) Index is arranged based on *trinity of financial system stability* by using 11 indicators classified into 3 major categories namely Islamic Banking Institution Pressure Index, Islamic Banking Institution Intermdiary index, and Islamic Banking Institution Efficiency Index.

Variables reflecting degree of pressure from Islamic banking financial institutions are Non Performing Financing (NPF), Capital Adequacy Ratio (CAR), Return on Assets (ROA), and delta liquidity (ΔL). Variables reflecting Islamic banking intermediation are the Spread Financing margin to DPK margin (SFTD), Gap Financing to Deposi Ratio (Gap FDR), Financing to GDP ratio (F/GDP) and Gap Gross Domestic Product (Gap GDP). Variables reflecting Islamic banking efficiency are Net Operating Margin (NOM), Operational Efficiency Ratio (BOPO), Cost to Income Ratio (CIR), and Overhead Cost to total Operating Revenue (OHC/PO).

Data used in this study is secondary monthly time series data starting from January 2010 until December 2016. The usage of monthly data based on technical statistics consideration related to *degree of freedom* problem and limitation of publication, while the selection time period from 2010 until 2016 based on the period after being issued Act of The Republic Indonesia Number 21 of 2008 concerning Shariah (Islamic) banking. These regulation practice certainly have undergone evolutionary episodes of juridical legal base not only for the growth and development of sharia banking but also for possibility development islamic window by conventional banks in Indonesia. It was assumed that 1 year is effective period of sosialisation of regulation, where another 1 year is build upcomplete economic situation in Indonesia (normal-recession-crisis) that makes this study applicable for such future situation.

B. Data Collecting Method and Sources

This study uses documentary collecting method Payne and Payne (2004) describe the documentary method as the techniques used to categorise, investigate, interpret and identify the limitations of physical. This method try to analysis documents that contain information about the phenomenon we wish to study (Bailey 1994).

Datas are obtained from various sources published periodically by (i) Bank

Indonesia (BI), (ii) Financial Services Authority (OJK) and (ii) Central Bureau of Statistics (BPS) such as *Indonesia Islamic Banking Statistics* (SPSI) and *Indonesia Financial Economic Statistics* (SEKI) report. This study also obtains relevant information from official websites, magazines, journals and articles regarding to the relevant study.

C. Data Analysis Model and Hypothesis Testing

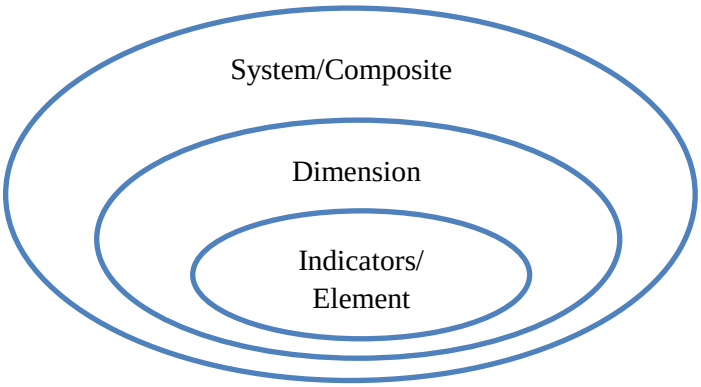
This study uses indexing method with standardization normalization basic year approach to analyze SHABAR index. This method is used to achieve research objectives and answer the existing problem formulation. This study uses this method because it normalizes the outliers in the data series, making it easy to make adjustments in scale, facilitating the transformation and aggregation of abnormal data. Moreover the main reason for using this method because it is able to illustrate complex and sometimes elusive issues in wide-ranging fields especially banking system.

Step 1: Developing A Theoretical Framework

1) Complex Adaptive System Theory

Complexity results from the inter-relationship, inter-action and inter-connectivity of indicators within a system and between a system and its environment. Many natural systems (e.g., brains, immune systems, ecologies, societies included politic and economic) and increasingly, many artificial systems (parallel and distributed computing systems, artificial intelligence systems, artificial neural networks, evolutionary programs) are characterized by apparently complex behaviors that emerge as a result of often nonlinear spatio-temporal interactions among a large number of component systems at different levels of organization. These systems have recently become known as Complex Adaptive Systems (CAS).[5]

Banking system as part of economy face same characteristic of complex behawviour from nonlinear interactions among a large number of indicator at different level that emerge of the whole system of even economy and a country. Constructing the resilience of sharia banking can be done by feasible monitoring process of every indicator in the banking system itself, so that every movement that can be measured and advanced with a quick and precise decision.



Source: Marchi, 2014 with adjustment

FIGURE 3.2
Illustration of CAS in Constructing Composite Indicators

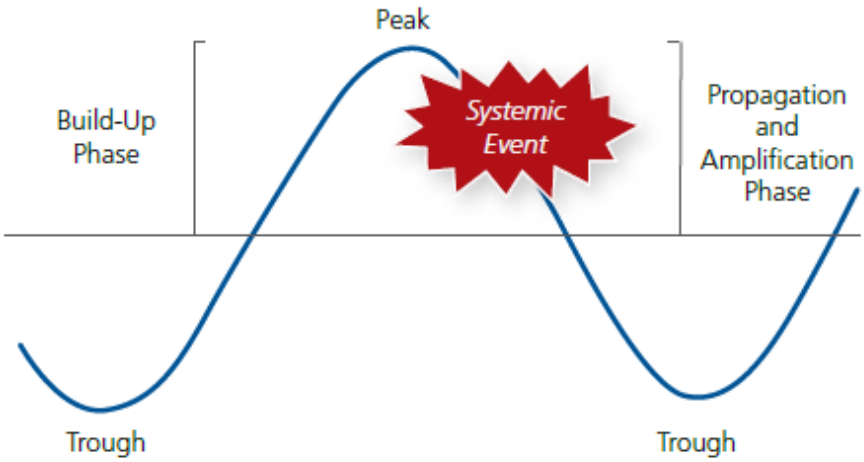
[5] Ibid

2) Financial Cycle Phase Theory

In the financial cycle, the *build up phase* is the stage of source formation interference. In this phase, market participants tend to take advantage of conditions to achieve the greatest profits even though prudential rules have been applied. This phase is illustrated in the upward or upswing cycle segment (Figure 3.1). Under these conditions systemic risk measurement needs to be focused on measurement of financial system imbalance, and measurement against a stress indicator that can show signs that the financial cycle has been approaching its peak which is interpreted as a risk-taking behavior already excessive

Imbalances detected here are related with the behavior of bank's procyclicality in lending. establishment of financial cycle indicators, as described previously also one of the efforts to detect imbalances in the financial system because of the perception of market participants against economic conditions and behavior take its risks. Furthermore, the source of the materialized disturbance becomes a risk will spread in the propagation phase or *propagation mechanism*. That phase happens after and between the peak of the financial cycle until the cycle reaches basically or trough (Figure 3.1). In this phase the problem occurs in one elements of the banking system tend to be transmitted or propagated on sectors or other elements of the banking system. Therefore, the measurement of risk systemic in this phase generally use cross sectional indicator. Indicator the most needed in this case are indicators that indicate the relationship between physical exposures among financial system elements, including for every individual element of the financial system is primarily a financial institution and corporation

The last phase is the systemic event phase or also called ss *materialized shock*. The phase is related to the financial crisis.



Source: KSK, 2015

FIGURE 3.3

Financial Cycle Phases

Data in the past shows that the crisis generally occurs around 2 years after the peak of the financial cycle. Thus, systemic event is a very short period in the *propagation phase* due to shock and vulnerability occurs and establishes systemic risk. After systemic event occurs, the downswing segment formed can be U-shaped or V-shaped. If U-shaped, downswing will last deeper and longer in the cycle finance and accompanied by a long recovery period. That condition which has the potential to have structural impacts. If it is V-shaped, downswing will take place in a shorter period and recovery or recovery will also take place quickly. In the financial cycle, systemic events can just does not happen because in the downswing segment market participants are already on system which potentially leads to create systemic system. Realizing how to deal with risks spread out, and the precise momentum to release the particular instrument of macroprudential policy so that the potential risks can be prevented and spread accross financial system, macroeconomic, and real sector (Ascarya et al, 2016).

This study spesifies to construct such index to monitor the financial system until risk signaling which are the first four steps in conducting macroprudential surveillance process. Macroprudential policy appear in the critical points when crossing below or above the tolerated thresholds. Based on figure 3.3 it happen in fist step of financial system surveillance.

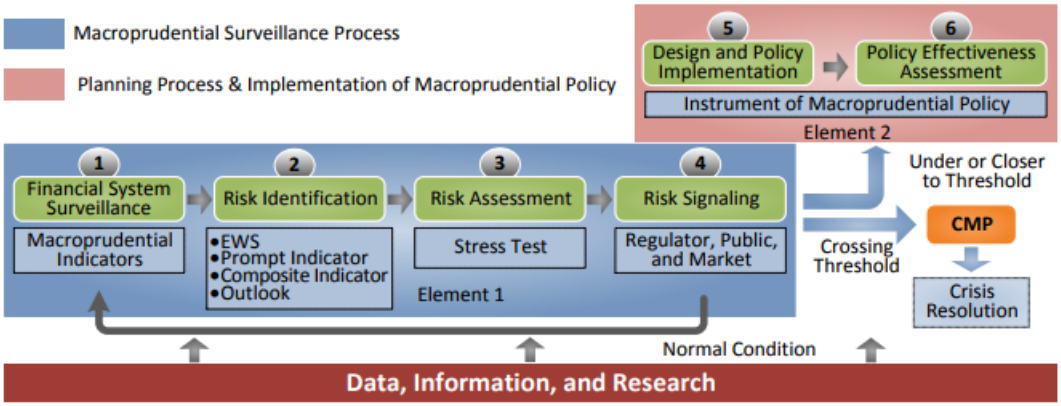


FIGURE 3.3

Conventional Macroprudential Framework in Bank Indonesia

automatically adjust its portfolio to reduce potential losses. It depends on the resilience of the elements of the financial system.

3) Defining Resilience and Signal Crisis

To determine the level of resilience of sharia banking in Indonesia, the first step is understanding the flows of macroprudential framework in Indonesia in order to identified risk embodied in the financial

After determining the area of banking resilience, the next step is determine the definition of resilience itself. This definition is done to focus the study on the initial objectives and facilitate the identification of whether the value of the index SHABAR exceeds its threshold or not. If the variable crosses the threshold, a signal is emitted, will determine whether the composite of sharia banking is in a

position of resilience or not. The definition of resilience as follow:

The signal is constructed to be a binary variable where $S_{x_t} = (0,1)$. If the variable crosses the threshold, a signal is emitted $S_{x_t} = 1$. Mathematically, it can be described,

$$\{S_{x_t} = 1\} = \{|x_t| > |x_{t*}|\} \quad (4)$$

meanwhile, If the indicator remains within its threshold boundary, it behaves normally and does not issue a signal, so $S_{x_t} = 0$.

$$\{S_{x_t} = 0\} = \{|x_t| < |x_{t*}|\} \quad (5)$$

in terms of defining crisis, the research borrows the SHABAR, as follows:

$$\{C_{x_t} = 0\} = \{SHABAR\ Index < Threshold\} \quad (6)$$

$$\{C_{x_t} = 1\} = \{SHABAR\ Index > Threshold\} \quad (7)$$

Where:

S_{x_t} : Signal variable relating indicator x_t in t-period

x_t : Value of indicator x_t in *t*-period

x_* : Threshold of the indicator

$\bar{\partial}_{2\ years}$: Standard deviation of of x_t in 2011

In addition, in taking a conclusive remark, it is important to notice the directional sign[6] may vary depending on whether the indicators (leading indicators) in resilience level equestions above are expressed in absolute terms. After that, it needs to obtain a binary time series of signal or no-signal observations.

Interpreting Crisis and Signal Framework Once the crisis and signal are defined, the evaluation criteria can be conducted by using matrix framework. Kaminsky, et. al (1998) developed matrix crisis-signal framework by using 12 months as signal window horizon, as follows:

TABLE 3.1

The Performance of Individual Indicator by Matrix Crisis-Signal Framework

Table of Statistical Error	Actual	
	Crisis (C=1)	No Crisis (C=0)
Signal Issued (S=1)	Correct Signal (A)	No Stress Event (B)
No Signal Issued (S=0)	Type I Error (C)	Correct Signal (D)

Source: Ito, et al., 2014 in WP/7/2015 BI

In this matrix, A is the number of months in which the indicator issued a good signal, B is the number of months in which the indicator issued a bad signal or "noise", C is the number of months in which the indicator failed to issue a signal (which would have been a good signal), and D is the number of months in which the indicator refrained from issuing a signal (which would have been a bad signal). It would issue a signal in every month that is to be followed by a crisis (within the next n months, example 12 months), so that A > 0 and C = 0, and it would refrain from issuing a signal in every month that is not to be followed by a crisis (within the next n months, example 12 months), so that B = 0 and D > 0. For sure, none of the indicators fit the profile of a perfect indicator, but the

[6] Loc.cit

matrix will be a useful reference to assess how close or how far is each indicator from that profile.

4) Determining Evaluation Criteria

This study employs six evaluation criteria in order to assess the performance of indicators which was identified through crisis-signal framework, as follows:

(1) The proportion of observations correctly called $= \frac{A+D}{(B+D)+(A+C)}$, defined as the proportion that all observations correctly bring information about crisis and not crisis. This implies that the higher proportion occurred will lead to best evaluation criteria.

(2) The noise-to-Signal-Ratio $= \frac{\frac{B}{B+D}}{\frac{A}{A+C}}$, it measures the false signals as a ratio of the good signals issued. The selection rule is to pick the variable or model that minimizes the noise to signal ratio (NTS).

(3) The proportion of crises correctly called $= \frac{A}{A+C}$, defined as the proportion of crisis happened once the signal was issued. Thus, the higher of its proportion would be fitting of a perfect indicator in signaling the crisis.

(4) The proportion of false alarm of total alarms issued $= \frac{B}{A+B}$, given that an individual indicator exposes a frequent false signal. Thus, the lower of its proportion would be good to minimize the panic behavior in the markets.

(5) The proportion of crisis given an alarm issued $= \frac{A}{A+B}$, given that an individual indicator generates different signals. This criterion is to select indicators that can maximize the probability of a crisis, given a signal was issued as alarm.

(6) The proportion of probability of crisis given no alarm issued $= \frac{C}{C+D}$, given the signal is important, an occurence of crisis without signals was extremely reduced or minimized.

5) Determining Signalling Horizon

The Study involves various signaling horizons to be chosen as the fit horizon that can predic the crisis. This signaling horizons are range of period that has ability for anticipating a crisis. Kaminsky (1997) uses 24 month signaling horizon. He argued that the longer signaling horizon would enable policy makers to anticipate a crisis. Meanwhile, Bussiere and Fratzscher (2002) set 12 and 18 month as signal horizon. They argues that various time horizons would provide the best achievable trade-off between missing crises and wrong signal. In addition, this paper adds another 3 and 6 month as signaling horizons considering that a crisis is difficult to be predicted. Providing short horizon enables policy makers to react immediately as crisis starts to buildup.

6) Determining Thresholds

Describing conditions on the indices that have been established thresholds required one (thresold) making it easier to determine the conditions and steps to be taken. Beginning the formulation by the reference of Bank Indonesia threshold namely 2 standard deviation (SD), 1,7 SD, and 1,3 SD to construct SHABAR index threshold. Later, the all mentioned

thresholds are used to determine the —level of resilience in Islamic Bank.

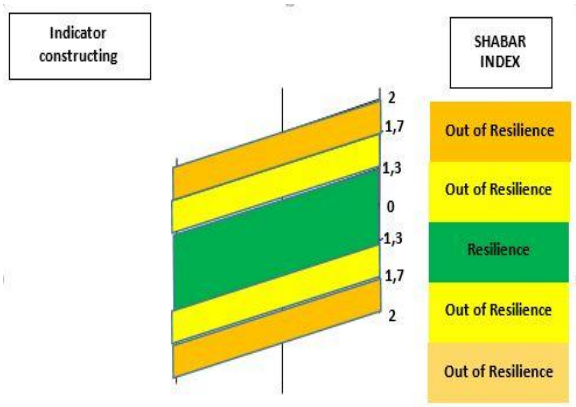


FIGURE 3.4
SHABAR Index's Threshold

Step 3: Imputation of Missing Data

The data used in this research is secondary data from Bank Indonesia categorized as monthly time series data from January 2010 to Desember 2016. The study period is chosen as a benchmark for sharia banking and financial system of Indonesia on the period experienced a complete regulation after enactment Act No. Number 21 of 2008 Concerning *Sharia (Islamic) Banking* which brought adequate regulation for expansion and operation of Islamic Bank in proper way. This step can be skipped by the availability of adequate data.

Step 4: Normalisation of Data

Sharia Banking Resilience (SHABAR) Index formed using the *statistical normalization* approach base year 2011, when banking performance is in the most stable level compare to the other years.[7]

Statistical Normalization approach Sharia Banking Resilience (SHABAR) Index base year 2011 is used as forming the single index, dimension index, and the Threshold is then translated into the 4 conditions, the resilience condition, alert condition out of resilience, warning condition out of resilience, and crisis conditions.

Step 2: Selecting Varibles (Research Variable and Operational Definition)

This study uses variables derive from all data of IIFS listed in Ba nk Indonesia. Operational definitions of each variable used in this study are as follow:

main index (SHABAR Index) sequentially. Methodology of calculation using the statistical approach normalization base year 2011, was formed through the following calculation:

$$Q_t = \sum_{j=1}^{n} \omega_j \frac{x_t^j - \bar{x}_{(based\ year)}}{\bar{\sigma}_{(based\ year)}} \quad (8)$$

Where:

Q_t : Composite Index (Single, dimension, main)

ω_t : Weight value of each variable

x_t^j : Value of variable x_t in t-period

$\bar{x}_{based\ year}$: Average variables of x_t in 2011

$\bar{\partial}_{2\ years}$: Standard deviation of of x_t in 2011

The period of 2011 base year as a benchmark for sharia banking and financial system of Indonesia on the period experienced a complete regulation after enactment Act No. Number 21 of 2008 Concerning *Sharia (Islamic) Banking* which brought adequate regulation for expansion and operation of Islamic Bank in proper way.

[7] ibid

Step 5: Weighting and Aggregation for Every Indicators

The result of normalization of each indicator (single index) of Islamic Bank will be merged into an index with a certain weight (dimension index). Weighting will be determined through variance of the standard deviation of the sample mean to put into strengths in the interpretation of SHABAR Index. The approach is expected to perform the synchronization between the perceptions of security conditions Islamic banking financial institutions with the movement of the Index.

The calculation of the weighting method by using variance of the standard deviation can be described in the following formula:

$$Var_{(mean)} = \frac{1}{N} Var(x), where\ \partial_{mean} = \frac{\partial}{\sqrt{N}} \quad (9)$$

Where:

$Var_{(mean)}$: Mean of the Variance (Weight index)

N : Number of observations in the sample used

∂_{mean} : Annually standard deviation of the mean of x_t

∂ : Standard deviation of x_t

The use of positive and negative sign indicates the direction vector of each indicator against which SHABAR index was formed, the positive influence showed that the higher the pressure on the index and vice versa. Especially for the Index Banking Intermediation, a positive sign indicates an increase in intermediation and the negative sign indicates a decrease in intermediation.

Step 6: Accuracy Test

To measure the accuracy of forecasting calibration probability of resilient use Quadratic Probability Score (QPS). QPS has a range from 0 to 2, when score = 0 reflects very accurately with the following formula:

$$QPS = \frac{1}{T} \sum_{t=1} 2(P_t - R_t)^2 \quad (10)$$

Where:

P = Forecasting

R = Realisation

T = Period

Meanwhile, the calibration of probability forecasting relates to the accuracy of probability forecasting and the observed relative frequency. Calibration compares the average probability forecast to the average of its realization. Global Square Bias (GSB) values have ranges from 0 to 2 with score value = 0 reflecting perfect calibration. The formula is as follows:

$$GSB = 2(\bar{P} - \bar{R})^2, \quad (11)$$

where $\bar{P} = \frac{1}{T} \sum_{t=1}^{T} P_t\ P$ and

$$\bar{P} = \frac{1}{T} \sum_{t=1}^{T} P_t \quad (12)$$

Step 7: Back to The Details

One of the weaknesses in the Indexation of the indicators is difficult, to do trace back to see the source of the pressure on the Index. Heat map is one of the best visualization tools for dense point data. They are also useful for doing cluster analysis or hotspot analysis. I this study, Heat map or chart indicators with color indication as manual vulnerability level of the indicator. Heat map of SHABAR Index show the entire Index results in terms of pressure, intermediation and banking efficiency.

For each composite Index will be composed of the composite Index constituent, presence Heat Map make easy see the source of vulnerability. The use of variation color in the Heat Map refers to the threshold (treshold). Overall there are three colors on the Heat Map SHABAR index, green depicts resilience condition, with color indicator stands at a better value than the first treshold. Yellow color (two degradation depict below and upper threshold) depict alert condition out of resilience threshold, the indicator value in these conditions is between treshold first and second treshold. The orange color, warning fase before crisis in resiliency of Islamic Bank. If it is more than upper threshold or below the lower threshold depict crisis in Banking.

IV. RESULT AND DISCUSSION

D. Results SHABAR Index with Standardized Normalization Approach

$$SHABAR\ Index_t = 0{,}07(Pressure\ Index)_t - 0{,}75(Interm.Index)_t + 0{,}19(Efficiency\ Index)_t \quad (17)$$

$$Pressure\ Index_t = 0{,}18(NPF)_t - 0{,}59(CAR)_t - 0{,}07(ROA)_t - 0{,}16(\Delta Liquidity)_t \quad (18)$$

$$Intermediation\ Index_t = -0{,}23(SFTD)_t + 0{,}04(GAP\ FDR)_t + 0{,}02(Financing/GDP)_t + 0{,}71(Gap\ GDP) \quad (19)$$

$$Efficiency\ Index_t = -(0{,}07(NOM)_t - 0{,}49(BOPO)_t - 0{,}35(CIR)_t - 0{,}09(OHC/PO)_t \quad (20)$$

SHABAR Index formation, with a based year approach to statistical normalization of monthly time series data from January 2010 to December 2016. This is modified by the availability of existing data. After determining the Index normalization method, the selection of indicators, then finally it is obtained specific weight for each dimension forming SHABAR Index. It is shown in Formula (17) to (20) above.

Based on formula (17), pressure index contribute positively 7% to SHABAR index, while intermediary index contribute negetively 75% and efficiency index contribute positively 19%. In the formula (18), NPF contribute positively 18% to the pressure index, while CAR contribute negetively 59%, ROA contribute negatively 7%, and Δliquidity contribute positively 16%. In the formula (19), SFTD contribute negatively 23% to the intermediary index, while GapFDR contribute positively 4%, F/GDP contribute positively 2%, and Δliquidity contribute positively 71%. formula (20) shows negative contribution of NOM in the level of 7% to the efficiency index, BOPO contribute negatively 49%, CIR contribute negatively 35%, and OHC/PO contribute negatively 9%.

E. Result of Accuration Test of SHABAR Index

Composite Index

TABLE 4.2
Test Accuration of SHABAR Index with Upper Treshold

	Items		Threshold		
			1,3	1,7	2
Upper Threshold	Loss	24 month	0,169109	0,086907	0,09198
		12 month	0,005556	0,033437	0,048758
		6 month	0,046784	0,057019	0,070779
		3 month	0,08538	0,080128	0,092788
		current year	0,106322	0,103241	0,109259
	QPS		73,80952	73,80952	70,2381
	GSB		94,33107	92,50283	91,14229

TABLE 4.3
Test Accuration of SHABAR Index
with Lower Treshold

	Items		Threshold		
			1,3	1,7	2
Lower Threshold	Loss	24 month	0,077193	0,016667	0,016667
		12 month	0,021131	0,019591	0,019591
		6 month	0,02284	0,022121	0,022121
		3 month	0,02284	0,022121	0,022121
		current year	0,02284	0,022121	0,022121
	QPS		88,09524	94,04762	94,04762
	GSB		99,94331	99,64569	99,64569

Dimension Index

TABLE 4.4
QPS and GSB of Dimention Index

e

Category	NO	Indicator	Trend	Loss (1,3)	Threshold 1,3 Lamdha=1600 (Bank Indonesia)	Accuracy and Calibration	
Dimension Index (μ = 0,5)	2.1	Pressure Index	One Side HPF	0,021	Upper Threshold	QPS	82,14
						GSB	99,65
			One Side HPF	0,08	Lower Threshold	QPS	69,05
						GSB	91,84
	2.2	Intermdiary index	One Side HPF	0,073	Upper Threshold	QPS	65,48
						GSB	95,90
			One Side HPF	0,017	Lower Threshold	QPS	85,71
						GSB	97,96
	2.3	Efficiency Index	One Side HPF	0,06	Upper Threshold	QPS	82,14
						GSB	99,31
			One Side HPF	0,117	Lower Threshold	QPS	80,95
						GSB	99,94

Table 4.1 and 4.2 explain the result of accuration test for SHABAR index with upper and lower threshold, the resut as follow:

a. The smallest loss value for Upper threshold is 0,005556 occurs at 12 month prediction month with threshold 1,3.

b. The smallest Loss value for the Lower Threshold is 0.016667 occurs on the 24 month prediction month with the threshold of 1.7 and 2

c. The smallest loss value for the threshold is 0,005556 occurs at prediction month 12 months with threshold 1,3

d. The largest percentage of QPS for Upper threshold that is 73,80952 occurs at threshold 1,3 and 1,7

e. The largest percentage of QPS for the Lower threshold of 94.04762 occurs at the threshold of 1.7 and 2

f. The largest percentage of GSB for Upper threshold is 94.33107 occurs at threshold 1.3

g. The percentage of GSB is the same for each level (1.3, 1.7 and 2) in the Lower threshold

Table 4.3 shows the result of accuration test of every dimension index constructing SHABAR index. The red color show the accuracy below the standard, while the other are in it track. Generally, all constucted dimention index shows good accuracy performance more than 66,67%. The dimension index that shows less accuracy performance is intermediary index which has QPS level only 65,48%.

Single Index

TABLE 4.5

QPS and GSB of Dimention Index

Category	NO	Indicator	Trend	Loss	Threshold 1,3 Lamdha=1600 (Bank Indonesia)	Accuracy and Calibration	
Single Index (μ = 0,5)	3.1	NPF	One Side HPF	0,048	Upper Threshold	QPS	91,66667
						GSB	99,30556
		NPF	One Side HPF	0,074	Lower Threshold	QPS	89,28571
						GSB	99,98583
	3.2	ROA	One Side HPF	0,061	Upper Threshold	QPS	78,57143
						GSB	97,95918
		ROA	One Side HPF	0,09	Lower Threshold	QPS	72,61905
						GSB	93,75
	3.3	CAR	One Side HPF	0,022	Upper Threshold	QPS	95,2381
						GSB	99,94331
		CAR	One Side HPF	0,25	Lower Threshold	QPS	46,42857
						GSB	84,56633
	3.4	ΔL	One Side HPF	0,036	Upper Threshold	QPS	80,95238
						GSB	98,58277
		ΔL	One Side HPF	0,098	Lower Threshold	QPS	75
						GSB	94,88379
	3.5	SFTD	One Side HPF	0,094	Upper Threshold	QPS	66,66667
						GSB	90,4195
		SFTD	One Side HPF	0,025	Lower Threshold	QPS	84,52381
						GSB	97,60488
	3.6	GapFDR	One Side HPF	0,095	Upper Threshold	QPS	83,33333
						GSB	98,58277
		GapFDR	One Side HPF	0,122	Lower Threshold	QPS	63,09524
						GSB	94,88379
	3.7	GDP	One Side HPF	0,025	Upper Threshold	QPS	98,80952
						GSB	99,98583
		GapGDP	One Side HPF	0,017	Lower Threshold	QPS	100
						GSB	100
	3.8	GDP	One Side HPF	0,081	Upper Threshold	QPS	63,09524
						GSB	88,08107
		GapGDP	One Side HPF	0,021	Lower Threshold	QPS	82,14286
						GSB	99,30556
	3.9	NOM	One Side HPF	0,058	Upper Threshold	QPS	76,19048
						GSB	99,94331
		NOM	One Side HPF	0,108	Lower Threshold	QPS	66,66667
						GSB	90,4195
	3.10	BOPO	One Side HPF	0,088	Upper Threshold	QPS	80,95238
						GSB	97,22222
		BOPO	One Side HPF	0,027	Lower Threshold	QPS	77,38095
						GSB	95,9042
	3.11	CIR	One Side HPF	0,033	Upper Threshold	QPS	73,80952
						GSB	99,4898
		CIR	One Side HPF	0,033	Lower Threshold	QPS	77,38095
						GSB	97,60488
	3.12	OHC/PO	One Side HPF	0,021	Upper Threshold	QPS	90,47619
						GSB	99,09297
		OHC/PO	One Side HPF	0,08	Lower Threshold	QPS	65,47619
						GSB	88,08107

Table 4.4 shows the result of accuration test of every single index constructing SHABAR index. The red color show the accuracy below the standard, while the other are in it track. Generally, all indicators shows good accuracy performance more than 66,67%. The single indices that show less accuracy performance are lower threshold of CAR, GapFDR, NOM, and OHC/PO, while the upper one is SFTD. CAR has QPS level only 46,43%, GapFDR 63%, NOM 66,67%, and OHC/PO 65,48%. SFTD has only QPS level 66,67%.

F. Resilience Level of SHABAR Index

1. Composite Index

TABLE 4.5

Resilience Level of Composite Index(CI)

NO	Indicator	Probability of Systemic Risk (C & B)	Threshold (index)		Resilience Level
1.1	SHABAR Index/CI	0,03	Upper	4,4	0,994
1.2	SHABAR Index/CI	0,07	Lower	3,2	0,979

Table 4.5 shows the resilience level of SHABAR Index. For SHABAR Index (IC) itself, Resilience level exist in the range level of 0,979 to 0,994 with upper threshold 4,4 and lower threshold 3,2. Probability level of systemic risk happen only reach 3% for upper threshold and 7% for lower threshold of all crisis possibilities based on sample.

2. Dimention Index

TABLE 4.6

Resilience Level of Dimension Index

NO	Indicator	Probability of Systemic Risk (C & B)	Threshold (index)		Resilience Level
2.1	Pressure Index	0,07	Upper	0,1	0,979
	Pressure Index	0,42	Lower	0,0	0,920
2.2	Intermdiary index	0,33	Upper	6,3	0,927
	Intermdiary index	0,03	Lower	4,4	0,983
2.3	Efficiency Index	0,20	Upper	-0,3	0,945
	Efficiency Index	0,23	Lower	-1,7	0,974

Table 4.6 shows the resilience level of dimension index constructing CI. Resilience level of Pressure index exist in the range level of 0,920 to 0,979 with upper threshold 0,0 and lower threshold 0,1. Probability level of systemic risk happen reach 7% for upper threshold and 43% for lower threshold of all crisis possibilities based on sample.

While resilience level of intermediary index exist in the range level of 0,927 to 0,983 with upper threshold 4,4 and lower threshold 6,3. Probability level of systemic risk happen reach 33% for upper threshold and 3% for lower threshold of all crisis possibilities based on sample.

And the last, resilience level of efficiency index exist in the range level of 0,945 to 0,974 with upper threshold -1,7 and lower threshold -0,3. Probability level of systemic risk happen reach 20% for upper threshold and 23% for lower threshold of all crisis possibilities based on sample.

3. Single Index

TABLE 4.7

Resilience Level of Single Index

Components of Pressure Index				
No	**Indicator**	**Probability of Systemic Risk (C & B)**	**Threshold (index)**	**Resilience Level**
3A	NPF	0,10	0,4	0,953
3A	NPF	0,15	-0,7	0,926
4A	ROA	0,25	0,4	0,939
4A	ROA	0,28	0,0	0,910
5A	CAR	0,08	-0,7	0,978
5A	CAR	0,50	-0,9	0,750
6A	ΔL	0,08	0,5	0,964

6A	ΔL	0,35	-0,4	0,902
Components of Intermediary Index				
	SFTD	0,33	-0,3	0,906
	SFTD	0,17	-0,6	0,975
	GapFDR	0,22	0,4	0,905
	GapFDR	0,23	0,1	0,878
	F/GDP	0,05	1,8	0,975
	F/GDP	0,03	-0,8	0,983
	GapGDP	0,18	8,9	0,919
	GapGDP	0,07	6,3	0,979
Components of Efficiency Index				
	NOM	0,20	0,7	0,942
	NOM	0,45	0,6	0,892
	BOPO	0,30	0,2	0,912
	BOPO	0,27	-0,4	0,973
	CIR	0,07	-1,1	0,967
	CIR	0,07	-4,3	0,967
	OHC.PO	0,07	-0,3	0,979
	OHC.PO	0,23	-0,6	0,920

Table 4.7 shows the resilience level of single index constructing CI. From pressure's side, sesilience level of NPF exist in the range level of 0,926 to 0,953 with upper threshold 0,4 and lower threshold -0,7. Probability level of systemic risk happen reach 10% -15% of all crisis possibilities based on sample.

Resilience level of ROA exist in the range level of 0,910 to 0,939 with upper threshold 4,4 and lower threshold 6,3. Probability level of systemic risk happen reach 25% -28% of all crisis possibilities based on sample.

Resilience level of CAR exist in the range level of 0,950 to 0,978 with upper threshold 0 and lower threshold -0,7. Probability level of systemic risk happen reach 8% -50% of all crisis possibilities based on sample.

Resilience level of ΔL exist in the range level of 0,902 to 0,964 with upper threshold 0,5 and lower threshold -0,4. Probability level of systemic risk happen reach 8-35%% of all crisis possibilities based on sample.

From intermediari's side, resilience level of SFTD exist in the range level of 0,906 to 0,975 with upper threshold -0,6 and lower threshold -0,3. Probability level of systemic risk happen reach 17-33%% of all crisis possibilities based on sample.

Resilience level of GapFDR exist in the range level of 0,878 to 0,905 with upper threshold 0,4 and lower threshold 0,1. Probability level of systemic risk happen reach 22% -23% of all crisis possibilities based on sample.

Resilience level of F/GDP exist in the range level of 0,975 to 0,983 with upper threshold 1,8 and lower threshold 0,8. Probability level of systemic risk happen reach 3% -5% of all crisis possibilities based on sample.

Resilience level of GapGDP exist in the range level of 0,919 to 0,979 with upper threshold 8.9 and lower threshold 6,3. Probability level of systemic risk happen reach 7-18%% of all crisis possibilities based on sample.

From efficienci's side, resilience level of NOM exist in the range level of 0,892 to 0,942 with upper threshold 0,7 and lower threshold 0,6. Probability level of systemic risk happen reach 20-45%% of all crisis possibilities based on sample.

Resilience level of BOPO exist in the range level of 0,912 to 0,973 with upper threshold 0,2 and lower threshold -0,4. Probability level of systemic risk happen reach 27% -30% of all crisis possibilities based on sample.

Resilience level of CIR exist in the level of 0, with upper threshold -1,1 and lower threshold -4,3. Probability level of systemic risk happen reach 7% of all crisis possibilities based on sample.

Resilience level of OHC/PO exist in the range level of 0,920 to 0,979 with upper threshold -0,3 and lower threshold -0,6. Probability level of systemic risk happen reach 7%-23% of all crisis possibilities based on sample.

1. Threshold Single Index

TABLE 4.8

Upper and Lower Treshold of Indicators

Indicator	Upper Threshold			Lower Threshold		
	Th 1,3	Th 1,7	Th 3	Th 1,3	Th 1,7	Th 3
NPF	0,38	0,55	0,68	-0,71	-0,88	-1,00
ROA	0,38	0,44	0,48	0,04	-0,02	-0,06
CAR	-0,67	-0,63	-0,61	-0,88	-0,92	-0,94
ΔL	0,46	0,59	0,69	-0,41	-0,54	-0,64
SFTD	-0,29	-0,24	-0,20	-0,62	-0,67	-0,71
Gap FDR	0,44	0,49	0,52	0,14	0,09	0,06
F/GDP	1,83	2,24	2,54	-0,81	-1,21	-1,52
Gap FDR	8,95	9,36	9,66	6,28	5,88	5,57
NOM	0,69	0,70	0,70	0,63	0,62	0,61
BOPO	0,19	0,28	0,35	-0,40	-0,49	-0,56
CIR	-1,14	-0,66	-0,30	-4,25	-4,73	-5,09
OHC/PO	-0,32	-0,27	-0,23	-0,65	-0,70	-0,74

From the above, we can see the result of upper and lower threshold of every single indicator constructing SHABAR index. Threshold 1,3 used as basic to determined resilience level because it is the most low threshold which contribute to the loss level in Sharian Banking.

G. Trace Back by Using Heat Map

One of the weaknesses in the Indexation of the indicators is difficult, to do trace back to see the source of the pressure on the Index. Heat map is one of the best visualization tools for dense point data. They are also useful for doing cluster analysis or hotspot analysis. I this study, Heat map or chart indicators with color indication as manual vulnerability level of the indicator. Heat map of SHABAR Index show the entire Index results in terms of pressure, intermediation and banking efficiency.

For each composite Index will be composed of the composite Index constituent, presence Heat Map make easy see the source of vulnerability. The use of variation color in the Heat Map refers to the threshold (treshold). Overall there are three colors on the Heat Map SHABAR Index, green depicts normal conditions, with color indicator stands at a better value than the first treshold. Yellow color depicts the standby state, the indicator value in these conditions is between treshold first and second treshold. The orange color, the standby state, the indicator on this color is at a value between.

TABLE 4.9
Heat Map SHABAR Index
(January 2010 - December 2016)

		Parameter	2010											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Agt	Sep	Oct	Nov	Des
Indicator		SHABAR	9,84	8,67	6,78	5,61	6,06	6,48	-1,72	2,75	2,37	2,13	1,30	1,00
		Pressure	-0,24	0,28	1,59	1,27	-2,16	-0,74	-0,48	-0,85	-0,07	0,05	0,25	-0,58
		Intermediary	12,93	11,44	9,30	7,63	7,13	8,29	-2,66	3,21	2,82	2,54	1,47	0,87
		Efficiency	1,03	0,56	-1,51	-0,98	4,68	1,81	1,61	2,19	1,45	1,27	0,99	2,07
Indicator	Pressure Index	NPF (%)	2,33	3,28	2,74	2,60	3,33	1,19	1,80	1,70	1,34	1,34	1,43	-0,92
		CAR (%)	-2,91	-2,82	-3,01	-2,46	-2,36	-2,06	-1,14	-1,36	-1,18	-0,57	-0,75	-0,31
		ROA (%)	-1,59	-0,79	1,92	1,41	-4,51	-1,52	-1,44	-1,74	-0,71	-0,57	-0,27	-1,44
		ΔLiquidity	3,01	2,18	1,11	0,88	0,41	0,55	0,80	-0,23	1,18	1,15	1,31	2,88
	Intermediary Index	SFTD	1,22	1,62	-1,44	-2,63	0,71	2,49	2,17	-2,37	0,00	2,20	0,45	0,79
		Gap FDR	-2,39	-1,39	0,39	0,62	1,10	0,87	0,55	2,08	0,59	0,32	0,62	-1,88
		F/GDP	-3,63	-3,65	-3,31	-3,16	-3,00	-2,71	-2,53	-2,24	-2,19	-1,99	-1,67	-1,44
		Gap GDP	18,05	15,76	13,63	11,66	9,83	10,89	-4,40	5,24	4,00	2,90	1,94	1,11
	Effisiency Index	NOM	2,97	2,97	0,66	-0,71	-0,49	-0,09	-0,62	0,88	0,88	0,62	1,46	0,93
		BOPO	7,03	1,80	-1,73	-0,83	7,97	2,06	1,84	2,44	1,16	0,99	-0,27	2,62
		CIR	-6,30	-0,17	-0,79	-0,51	3,12	2,81	2,50	2,90	2,54	2,23	2,90	1,99
		OHC/PO	-4,69	-5,27	-4,78	-3,86	-3,09	-1,98	-1,35	-0,96	-0,82	-0,51	0,04	0,31

Heat Map SHABAR Index Continuation

The above heat map are presented based on the single, dimension, and composite index data that have been formulated in the previous chapter. This heat map describes the condition of banking in Indonesia in 2010 after the enactment of Act Number 21 of 2008 Republic of Indonesia. Based on the above heat map it appears that the trend of banking conditions in Indonesia is beyond the threshold limit of its ideal level of resilience. Based on business cycle theory it possible happen if in the business implementation of sharia banking is too excessive (above upper threshold) or too defensive whereas looking for a safe level (below ideal resistance level).

The average indicator shows its resilience level near the end of 2010. CAR and BOPO are at their ideal resilience level in November, while Gap FDR and OHC/PO in October. NPF and F/GDP are at warning level in December. While ΔLiquidity successively is within its ideal resilience level in May and August, NOM indicator is in the most frequently alert horizon in 2010 compared to the other variables in May, June, and October. Other yellow horizon indicators occur in CIR and OHC/PO respectively in March and November. Pressure on banks is at its ideal level of resilience in October. Indicator such as Gap GDP, SFTD, and ROA is out of it's ideal level of resilience based on threshold 1,3. When it comes to lower economic growth compare to its trend, it could impact to the banking system. Moreover, sharia banking performance seems play in save area looking at lack contribution of ROA to the SHABAR index.

Heat Map SHABAR Index Continuation

Indicator	Indicator	Parameter	2012											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Agt	Sep	Oct	Nov	Des
		SHABAR	12,46	4,13	5,17	5,67	5,97	6,90	6,71	7,33	7,62	7,96	8,18	7,98
		Pressure	-2,16	-0,34	-0,39	-0,74	0,01	0,39	0,18	0,08	0,12	0,24	0,13	0,45
		Intermediary	16,15	6,43	78,90	8,60	9,12	10,46	10,25	11,07	11,48	11,99	12,28	12,11
		Efficiency	2,85	-3,52	-3,79	-3,82	-4,53	-5,11	-5,18	-5,12	-5,20	-5,51	-5,39	-5,89
	Pressure Index	NPF (%)	-1,74	-1,40	-1,55	-1,33	-1,14	-1,26	-1,16	-1,50	-1,60	-1,99	-2,18	-2,86
	Pressure Index	CAR (%)	-0,30	-0,48	-0,79	-0,98	-1,79	-0,38	-0,38	-0,63	-2,01	-1,20	-1,05	-1,41
	Pressure Index	ROA (%)	-3,71	-0,57	-0,27	-0,57	0,90	1,33	1,33	1,26	1,48	1,77	1,63	1,99
	Pressure Index	ΔLiquidity	2,24	1,75	0,63	-0,61	-1,14	-0,91	-2,34	-2,17	-2,02	-2,26	-2,29	-0,73
	Intermediary Index	SFTD	-0,70	-3,99	-0,38	-0,67	-1,23	2,12	-1,23	0,10	-0,30	0,08	-0,59	-3,03
	Intermediary Index	Gap FDR	-3,27	-1,94	-3,45	0,04	1,07	1,27	1,76	2,15	2,52	1,89	1,94	1,33
	Intermediary Index	F/GDP	1,78	1,95	2,50	2,40	2,79	3,25	3,55	3,92	4,44	4,94	5,37	6,07
	Intermediary Index	Gap GDP	23,11	10,40	11,36	12,26	13,10	13,89	14,63	15,33	15,99	16,62	17,22	17,79
	Effisiency Index	NOM	0,71	-0,89	0,31	-0,85	-0,09	1,19	0,53	-0,54	2,30	0,75	-0,14	2,12
	Effisiency Index	BOPO	8,40	0,43	-0,20	-0,20	-1,76	-2,27	-2,13	-2,11	-2,57	-2,98	-2,72	-3,27
	Effisiency Index	CIR	-3,00	-10,50	-10,69	-10,60	-11,07	-11,76	-12,02	-11,74	-11,90	-11,97	-11,84	-13,27
	Effisiency Index	OHC/PO	-2,99	0,04	0,26	0,54	2,29	0,33	0,43	0,67	0,67	0,93	1,02	2,32

Heat Map SHABAR Index Continuation

Indicator	Indicator	Parameter	2013											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Agt	Sep	Oct	Nov	Des
		SHABAR	9,60	9,71	10,06	10,67	10,24	10,17	10,83	10,37	10,03	9,87	9,36	9,22
		Pressure	2,08	1,12	1,69	1,16	0,26	0,23	-0,15	-0,01	0,04	-0,35	-0,27	-0,07
		Intermediary	14,80	14,74	15,10	15,85	15,27	14,91	15,73	15,04	14,58	14,22	13,50	13,33
		Efficiency	-8,64	-7,44	-7,24	-6,76	-6,43	-5,31	-4,92	-4,69	-4,65	-3,96	-3,82	-3,93
	Pressure Index	NPF (%)	-2,21	-1,65	-1,57	-1,33	-1,16	-1,84	-1,57	-0,94	-1,45	-1,07	-0,77	-1,89
	Pressure Index	CAR (%)	-0,81	-0,86	-1,33	-1,11	-1,34	-1,33	-0,81	-1,11	-1,38	-1,38	-2,41	-1,26
	Pressure Index	ROA (%)	4,77	3,09	3,82	3,09	1,48	1,70	1,11	1,04	1,26	0,53	0,68	0,97
	Pressure Index	ΔLiquidity	-1,77	-2,17	-1,20	-2,13	-1,93	-2,21	-2,94	-2,38	-2,16	-2,32	-2,25	-1,34
	Intermediary Index	SFTD	0,10	-1,60	-1,04	1,59	-1,07	-2,66	1,43	-0,40	-1,07	-0,75	-1,57	0,63
	Intermediary Index	Gap FDR	1,51	2,08	2,18	2,29	1,77	2,71	2,81	1,75	2,01	1,85	1,61	0,60
	Intermediary Index	F/GDP	6,22	6,62	7,28	7,44	7,77	8,10	8,36	8,29	8,50	8,62	8,71	8,96
	Intermediary Index	Gap GDP	20,55	20,98	21,28	21,47	21,54	21,48	21,29	20,98	20,52	19,93	19,18	18,28
	Effisiency Index	NOM	3,45	2,92	3,23	3,05	2,04	2,17	2,97	0,93	-0,45	-0,05	-0,31	1,15
	Effisiency Index	BOPO	-7,67	-6,01	-5,11	-4,09	-1,11	-1,82	-1,87	-0,10	0,02	1,11	0,64	0,25
	Effisiency Index	CIR	-13,81	-12,68	-13,76	-13,66	-15,73	-12,31	-11,26	-12,61	-12,45	-12,06	-10,94	-11,48
	Effisiency Index	OHC/PO	-3,18	-2,91	-1,67	-2,13	-5,79	-2,94	-3,05	-3,26	-3,02	-3,15	-3,14	-1,30

2011 heat map explains it appears that the trend of banking conditions in Indonesia has increased its resilience compare to previous year. Sharia banking stack in the ideal level of its resilience means it is not too excessive (above upper threshold) or too defensive (below ideal resistance level). Moreover it is entering 3 years after pass the enactment Number 21 of 2008. The socialization and implementation of regulation seems showing positive result.

The average indicator shows its resilience level near the end of 2011. CAR and BOPO are at their ideal resilience level in November, while Gap FDR and OHC / PO in October. NPF and F / GDP are at warning level in December. While ΔLiquidity successively is within its ideal resilience level in May and August, the NOM indicator is in the most frequently alert horizon in 2010 compared to the other variables in May, June, and October. Other yellow horizon indicators occur in CIR and OHC / PO respectively in March and November. Pressure on bank is at its ideal level of resilience in October.

The contribution of each indicator to the resilience of sharia banking in Indonesia appears to spread evenly throughout 2011. The most isgnificant is the F / GDP indicator which is almost at its ideal resilience level from April to December. Followed by NPF and BOPO indicator that experienced 5 period of resilience. The most minimal indicators contributing to banking resilience are CAR, ROA, and CIR. Even the GDP GDP does not show the resiliencenya level at all.

2012 heat map explains the single, dimension, and composite index data that have been formulated in the previous chapter. Based on the above heat map it appears that the trend of banking conditions in Indonesia is beyond the threshold limit of its ideal level of resilience. Based on business cycle theory it possible happen if in the business implementation of sharia banking is too excessive (above upper threshold) or too defensive whereas looking for a safe level (below ideal resistance level).

The average indicator shows its resilience level near the beginning of 2012. It shows that in February sharia banking is able to reach its resilience level. Main contribution comes from intermediary dimension by its F/GDP indicator shown alert horizon and same with OHC/PO. While intermediary contribute to resilience of sharia banks significantly, pressure dimension shows constant and the most frequently reach resilience level.

In this year, there is quite significant decrease in NPF role toward the contribution to SHABAR index. It is also happened to ROA and Gap FDR which does not significantly contribute to SHABAR index throughout 2012. Generally, indicators contribute to SHABAR index exist in the beginning of 2012 from January to May.

Based on the above heat map it appears that the trend of banking conditions in Indonesia is beyond the threshold limit of its ideal level of resilience even categorized as *red zone* compare to the other years.. Based on business cycle theory it possible happen if in the business implementation of sharia banking is too excessive (above upper threshold) or too defensive whereas looking for a safe level (below ideal resistance level).

Heat Map SHABAR Index Continuation

Indicator	Parameter	2014											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Agt	Sep	Oct	Nov	Des
Indicator	SHABAR	5,60	5,14	6,23	11,50	9,58	4,35	5,27	5,43	4,58	4,95	3,67	2,63
	Pressure	-8,27	-7,84	-3,49	-3,69	-3,24	-3,36	-3,56	-3,88	-3,62	-3,69	-3,84	-4,18
	Intermediary	8,25	7,42	7,37	15,38	11,73	4,33	5,54	6,36	5,07	5,02	3,76	2,28
	Efficiency	-0,08	0,59	5,10	1,33	5,52	7,17	7,35	5,02	5,55	7,72	5,98	6,46
Pressure Index	NPF (%)	-0,94	0,32	-0,43	0,22	1,51	1,21	2,19	2,86	3,08	3,28	3,54	2,26
	CAR (%)	-0,04	-0,07	-0,33	-0,08	0,01	-0,33	-1,09	-1,10	-1,17	-0,83	-0,62	-0,57
	ROA (%)	-13,07	-12,70	-5,17	-5,68	-5,39	-5,46	-5,98	-6,85	-6,56	-6,93	-7,29	-7,80
	ΔLiquidity	-2,41	-2,46	-2,08	-2,31	-2,06	-2,04	-2,20	-1,72	-1,38	-0,81	-0,81	0,39
Intermediary Index	SFTD	-3,43	-3,94	-0,99	-3,83	12,19	12,69	4,25	11,37	9,32	12,99	11,87	9,93
	Gap FDR	0,46	1,29	1,37	-1,53	0,17	0,77	0,40	0,04	0,38	0,11	-1,72	-3,02
	F/GDP	8,62	8,58	8,83	9,04	9,15	9,41	9,43	9,34	9,52	9,44	9,54	9,56
	Gap GDP	12,46	11,41	10,37	22,73	12,30	1,68	6,14	5,01	3,83	2,59	1,29	-0,10
Effisiency Index	NOM	-0,49	-3,06	-0,80	-0,49	-2,80	-3,20	-3,15	-3,90	-3,90	-5,01	-4,17	-3,59
	BOPO	2,12	5,91	14,19	6,65	14,11	13,78	13,89	15,00	21,98	19,76	18,71	19,35
	CIR	-0,71	-3,70	-3,85	-4,18	-0,98	4,27	4,92	-3,24	-11,58	-2,00	-5,70	-5,14
	OHC/PO	-9,35	-8,83	-4,95	-4,80	-9,48	-9,42	-10,70	-10,32	-9,85	-10,09	-10,02	-10,74

Heat Map SHABAR Index Continuation

Indicator	Parameter	2015											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Agt	Sep	Oct	Nov	Des
Indicator	SHABAR	5,29	5,29	5,56	4,16	4,21	4,73	4,02	4,30	4,32	4,20	-3,52	-2,77
	Pressure	-2,64	-2,84	-2,74	-3,03	-2,94	-3,97	-5,36	-5,52	-5,32	-5,33	-5,30	-5,27
	Intermediary	6,41	6,43	7,57	5,87	5,84	6,19	6,26	6,57	6,38	6,19	-3,92	-2,71
	Efficiency	3,59	3,60	0,48	-0,13	0,25	1,98	-1,61	-1,29	-0,49	-0,40	-1,30	-2,13
Pressure Index	NPF (%)	3,57	4,13	3,42	2,96	3,30	3,30	4,61	4,61	4,22	4,27	4,20	3,49
	CAR (%)	-1,40	-1,28	-1,26	-1,22	-1,29	-1,43	-1,24	-0,93	-0,88	-0,98	-1,32	-0,95
	ROA (%)	-5,25	-5,83	-5,39	-5,76	-5,68	-7,15	-10,00	-10,29	-10,07	-9,92	-9,85	-10,07
	ΔLiquidity	-0,59	-0,34	-0,51	-0,49	-0,58	-1,52	-1,27	-1,32	-0,49	-1,06	-0,94	0,67
Intermediary Index	SFTD	9,29	9,69	14,82	7,57	7,43	8,76	8,66	9,74	8,63	7,38	9,19	8,20
	Gap FDR	-2,06	-1,86	-1,67	-1,63	-1,34	-0,49	1,11	1,14	0,90	0,78	1,17	-0,11
	F/GDP	9,31	9,26	9,48	9,48	9,63	9,76	9,57	9,59	9,72	9,61	9,65	9,93
	Gap GDP	5,88	5,76	5,68	5,63	5,62	5,63	5,68	5,76	5,87	6,01	-8,83	-6,75
Effisiency Index	NOM	-6,70	-8,74	-5,77	-6,30	-4,88	-3,11	-4,44	-4,79	-4,61	-4,48	-4,39	-4,61
	BOPO	17,14	16,56	18,34	19,06	18,88	19,36	12,39	12,99	13,09	12,93	12,52	10,25
	CIR	-9,44	-8,19	-20,25	-22,91	-21,98	-18,12	-18,65	-18,47	-16,37	-15,84	-17,72	-17,00
	OHC/PO	-11,48	-11,57	-11,32	-11,23	-10,80	-10,53	-9,33	-9,48	-9,45	-9,80	-10,31	-9,77

Heat Map SHABAR Index Continuation

Indicator	Parameter	2016											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Agt	Sep	Oct	Nov	Des
Indicator	SHABAR	-2,81	-1,85	-0,13	1,97	8,61	5,82	8,36	11,40	4,45	5,07	5,26	6,03
	Pressure	-2,94	-3,68	-3,37	-3,75	-6,23	-3,99	-4,52	-5,07	-4,83	-5,38	-4,49	-4,59
	Intermediary	-0,72	12,20	3,31	5,70	15,09	11,17	14,63	18,79	9,53	10,57	10,73	11,05
	Efficiency	-11,18	-13,52	-12,76	-10,96	-12,12	-12,18	-12,25	-12,44	-12,63	-13,32	-13,24	-10,36
Pressure Index	NPF (%)	5,00	5,31	4,73	5,05	6,72	5,53	4,66	5,22	3,08	3,40	3,11	2,48
	CAR (%)	-0,90	-0,73	-1,01	-0,74	-1,07	-1,11	-1,03	-1,03	-0,74	-0,82	-0,55	-0,46
	ROA (%)	-6,27	-7,73	-7,22	-7,80	-12,48	-8,32	-9,05	-10,14	-9,34	-10,29	-8,75	-9,05
	ΔLiquidity	-0,47	-0,18	0,69	0,01	0,03	0,01	0,32	0,27	1,13	0,86	0,97	2,11
Intermediary Index	SFTD	9,40	9,37	8,74	8,44	7,89	7,11	7,91	10,44	10,14	12,80	11,58	10,81
	Gap FDR	0,09	-0,50	-0,08	-0,42	-1,16	-0,54	-1,04	-1,37	-1,36	-1,18	-1,47	-1,43
	F/GDP	9,68	9,64	9,73	9,65	9,96	10,26	10,00	9,94	11,14	11,23	11,44	12,01
	Gap GDP	-4,33	-1,57	1,56	5,05	18,49	13,17	17,82	22,89	9,90	10,49	11,13	11,80
Effisiency Index	NOM	-1,60	-2,75	-2,49	-2,49	-6,16	-3,46	-3,86	-4,57	-4,04	-4,70	-3,64	-3,90
	BOPO	3,88	-0,93	0,36	4,04	2,21	1,59	1,35	1,06	0,54	-0,71	-0,80	4,97
	CIR	-34,02	-33,85	-33,76	-33,78	-33,83	-33,81	-33,60	-33,63	-33,64	-33,71	-33,75	-33,75
	OHC/PO	-11,86	-11,43	-10,50	-10,48	-10,39	-9,83	-9,77	-9,70	-9,36	-9,42	-8,66	-7,86

Source: Data Analysis Result

The average indicator shows its resilience level near the end of 2013. Intermediary dimension show its lack contribution throughout 2013.Contribution comes from NPF, CAR, SFTD, NOM, BOPO mainly in the end of the year. While rest indicators does not have any green even yellow area at all, means those are lack of conribution. When it comes to lower economic growth compare to its trend, it could impact to the banking system. Moreover, sharia banking performance seems play in save area looking at lack contribution of ROA to the SHABAR index.

The above heat map are presented based on the single, dimension, and composite index data that have been formulated in the previous chapter. Based on the above heat map it appears that sharia banking has 2 times experiences of conditions in Indonesia is beyond the threshold limit of its ideal level of resilience. Based on business cycle theory it possible happen if in the business implementation of sharia banking is too excessive (above upper threshold) or too defensive whereas looking for a safe level (below ideal resistance level). For the following year, resilience level mostly existed in 2015

V. CONCLUSION

Islamic banking operates within the similar financial environment, its fundamental differences call for different treatment in building resilience. The existing literature on banking surveillance tools is either mostly for banking in general or is dominated by partial development. Hence, there is significant gap in the literature to address the specificities of Islamic banking and comprehensive banking surveillance tools analysis to build resilience that can contribute to financial stability in a country. This study explores this gap in case of Indonesia.

The study notes that there are 8 Steps on Constructing Sharia Banking Resilience (SHABAR) Index, namely; (1) Theoretical Framework, (2) Data Selection, (3) Imputation of Missing Data, (4) Normalization, (5) Weighting and Aggregation, (6) Robustness & Sensitivity test, (7) Back to The Real Data, (8) Presentation & Visualization.

As conclusion, resilience level of sharia banking in Indonesia exist in spesific range as the result of contribution every single indicator build it. Moreover, the study can run tracking of which indicator contributes to the instability of sharia banking system in Indonesia.

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