EFFECT OF ENDOGENOUS RISK ON SYSTEMIC RISK

IN INDONESIAN ISLAMIC BANKING

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ABSTRACT

Islamic banking assets accounted for less than 5% of conventional banking assets in Indonesia. Thus, studies on systemic risk or acute financial instability rarely investigated Islamic banking. This study performed in order to fill the absence.

It aimed at determining endogenous risk variables affecting the systemic risk in the Indonesian Islamic banking such as capital adequacy risk, contagion, credit risk, bank run, and liquidity risk. It applied multiple regression. Its statistical data sourced from Indonesian Islamic banking 2010-2016. The results showed that only liquidity risk and bank run significantly affected systemic risk, whereas credit risk, capital adequacy risk and contagion did not.

As conclusions, endogenous risk movement affected systemic risk movement by 38.07% in which the liquidity risk and bank run positively affected systemic risk in Indonesian Islamic banking. This study would expectedly contribute to bankers and the central bank in maintaining endogenous risk so as to avoid and mitigate effects of systemic risk in Indonesian Islamic banking in the absence of the Act on The Financial System Safety Net in Indonesia to avoid a bank with systemic impact.

Keywords: systemic risk, endogenous risk, regression, liquidity risk, bank run

INTRODUCTION

Markeloff, Warner and Wollin (2012) described the growing studies on the topic of systemic risk in the financial system that reflected the focus and attention of researchers were critical and needed for comprehending systemic risk for the stability of the financial system. Interest in this subject grew after the financial crisis of 2007 until 2009. In Indonesia, the topic got its popularity in the advent of Bank Century case, which commenced from the banking and financial incident and eventually expand to political interference.

Systemic risk occurred in the financial system consisting of financial institutions and banking asset accounted for 75-80% of their assets. Since banks dominating the financial system assets the disruption in the banking sector would affect stability of the financial system.

Alfiana (2016d) has studied impact of exogenous and endogenous risks in the Indonesian conventional banking. Although Islamic banking assets only accounting for less than 5% of the conventional one's, financial disruption / bankruptcy in the Islamic banking would affect stability of the financial system because of interbank interaction in terms of interbank loans, placement of fund in account of other banks, payment systems, clearing, etc.

Systemic risks in Islamic banking were studied due to its asset proportion considered as less influential. Consequently, it resulted in a hollow / chance for research. Bank Indonesia (2014) suggested definition of the systemic risk as interaction of size caused by contagious disruption resulting in the potential instability.

However, Bandt and Hartmann (2000) argued that the size of crisis management and mitigation of the problem source were the most important instead of the size of systemic events and incidents in the wide and narrow
contexts. Shock and contagion effects of failure could be interrelated in crisis. Therefore, despite its small assets, Islamic banking should still be counted in managing the Indonesian financial system and studies on systemic risk in Islamic banking were needed given characteristics of Islamic banking.

Different from Alfiana's research (2016b) studying endogenous and exogenous risks in the conventional banking, this paper specifically studied effects of endogenous risk on systemic risk in Islamic banking because exogenous risk variably affected all financial institutions in the financial system depending on the business sector.

Selected variables of endogenous risk were of major risks for the institution. They were obtained from secondary data of Islamic banking statistics such as credit risk, liquidity risk, capital availability risk, bank run and contagion as Hauben and Kakes (2004) suggested.

The study aimed at determining variables affecting systemic risk in Indonesian Islamic banking by endogenous risk, i.e. capital adequacy risk, contagion, credit risk, bank run, and liquidity risk partial and simultaneous.

Novelty of this study was the rare study on systemic risk in Islamic banking, the application of one of six proxies of systemic risk, namely a decrease in credit/credit reduction or, in the Islamic banking context, financing, in the financial system (Alfiana, 2015).

This study filled the absence of a study on the systemic risk in Islamic banking. It should expectedly be useful for bankers and central banks in maintaining banking risk and enrich the repertoire of study on systemic risk in Indonesia for observers and researchers.

LITERATURE REVIEW

Systemic risk

Systemic risk was defined as a risk or risks of disruption to financial services, which the decrease of all or part of the financial system brought about and potentially led to serious adverse consequences for the real economy (International Monetary Fund (IMF), the Financial Stability Board (FBS) and the Bank for International Settlements (BIS) for the G20 in Caruana (2010)).

Effects of systemic risk were: (1) To distort credit and capital supplies to the real economy (Adrian and Brunermeir, (2009); (2) To potentially bring adverse consequences of the availability of credit to the real economy (Adrian and Brunermeir, (2011)); (3) To decrease intermediation of the supply to the real economy (Acharya (2009) in Eijffinger (2009); (4) To lead to lower availability of credit potentially affecting the real economy (Acharya, 2011b)

Of the 4 effects above, decrease in credit was applicable as a proxy of systemic risk in accordance with Alfiana et al (2015).

Endogenous risk

Hauben, Kakes and Schinasi (2004), and Schinasi (2005) broke the risk of financial instability into endogenous and exogenous risks. Bank Indonesia (2007) suggested that endogenous risk was a source of financial instability. Hauben, Kakes and Schinasi (2004) and Schinasi (2005) argued that there were 3 kinds of endogenous risk in the financial system, namely endogenous risk by institution, market and infrastructures. Credit risk, liquidity risk, and the risk of capital availability were endogenous risks by financial institution, contagion was an endogenous risk by market, and bank run was an endogenous risk by infrastructure.

Endogenous risk depended on movements of financial system components that it was a risk inside the financial system.

1. Methodology

This study applied descriptive verificatory method and used secondary data of 76-month period ranging from January 2010 to April 2016. Processing data applied multiple regression. The independent variables were
credit risk, liquidity risk, capital adequacy risk, bank run and contagion, whereas the dependent variable was systemic risk.

Hypotheses partially proposed as follows:

H1: Credit risk significantly affected systemic risk
H2: Liquidity risk significantly affected systemic risk
H3: Capital adequacy risk affected systemic risk
H4: Bank run significantly affected systemic risk
H5: Contagion significantly affected systemic risk

A simultaneous hypothesis proposed as follows:

H6: Credit risk, liquidity risk, capital adequacy risk, bank run, and contagion simultaneously affected systemic risk

Multiple Regression Model

Systemic Risk = β0 + β1 Credit risk + β2 Liquidity risk + β3 Capital adequacy risk + β4 Bank run + β5 Contagion + ε

Figure 1: Framework

2. Analysis of Result and Discussion

An overview of Indonesian Islamic banking data presented below:

Figure 1: The movement of systemic risk
Sources: Islamic Banking Statistic Jan 2010- Apr 2016

Figure 2: The movement of credit risk
Sources: Islamic Banking Statistic Jan 2010- Apr 2016
Figure 3: The movement of liquidity risk
Sources: Islamic Banking Statistic Jan 2010-Apr 2016

Figure 4: The movement of capital adequacy risk
Source: Islamic Banking Statistic Jan 2010- Apr 2016

Figure 5: The movement of bank run
Sources: Islamic Banking Statistic Jan 2010-Apr 2016

Figure 6: The movement of contagion
Sources: Islamic Banking Statistic Jan 2010-Apr 2016
The graphs above present the changes of each variable studied during the study period. Data processing presented in the following table:

**Table 1 : Islamic Banking Data Processing Using Multiple Regression Resulting in Coefficients, t Statistics and Probability Before and After The Classical Assumption Test.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>The Test of Classical Linear Regression (CLR) Assumption</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Coefficient</td>
<td>t-Statistic</td>
</tr>
<tr>
<td>C</td>
<td>-5259.95</td>
<td>-0.984110</td>
</tr>
<tr>
<td>Credit Risk</td>
<td>-55106.54</td>
<td>-2.147946</td>
</tr>
<tr>
<td>Liquidity Risk</td>
<td>11625.59</td>
<td>2.429993</td>
</tr>
<tr>
<td>Capital Adequacy Risk</td>
<td>-9107.24</td>
<td>-0.684793</td>
</tr>
<tr>
<td>Bank Run</td>
<td>24152.65</td>
<td>3.090438</td>
</tr>
<tr>
<td>Contagion</td>
<td>-12231.15</td>
<td>-0.548623</td>
</tr>
</tbody>
</table>

Sources : Data Processing

**Table 2 R² Test And F Test Before and After The Classical Assumption Test**

<table>
<thead>
<tr>
<th>R Square</th>
<th>The Test of Classical Linear Regression (CRL) Assumption</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Value</td>
<td>t-Statistic</td>
</tr>
<tr>
<td>R Square</td>
<td>0.383357</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>8.703563</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Sources : Data processing

Multiple regression model result :


Table 1, through the test of classical linear regression assumption, partially showed that based on t statistic test, only liquidity risk and bank run affected systemic risk in Islamic banking in Indonesia. It was indicated by prob. lesser than α of 0.05.

Table 2, through the test of classical linear regression assumption, simultaneously showed credit risk, liquidity risk, capital adequacy risk and bank run affected systemic risk as seen in the F test with a probability of 0.000, where Ho was not. Hence, H1 was accepted. It meant, credit risk, liquidity risk, capital adequacy risk, and bank run simultaneously affected systemic risk.

R squared was 0.380705, which meant movement of credit risk, liquidity risk, capital adequacy risk and bank run affected movement in systemic risk by 38.07% and other variables not examined in this study affected the rest.

Previous studies presented in Table 3 showed that credit risk positively and negatively affected systemic risk and research in Indonesian Islamic banking showed that credit risk not significant affected on systemic risk.
The results were not in accordance with Gonzalez and Hermosillo (1999) concluding that bank collapse was brought about by credit risk condition and with Hauben et al (2004) inferring that the risk of credit was one of the possible sources of financial instability.

Table 3 displayed that liquidity risk positively and negatively affected systemic risk, and liquidity risk positively affected systemic risk in accordance with Gonzalez and Hermosillo (1999), Edison (2003) and Alfiana (2016b). This is in accordance with the opinion of Gonzalez and Hermosillo (1999) concluded that the downfall of a bank due to the condition of liquidity risk as well Hauben et al (2004) concluded that liquidity risk is one of the possible sources of financial instability.

Table 3 exhibited that capital adequacy risk positively and negatively affected systemic risk, it did not affect the risk in Indonesian Islamic banking. Kakes and Schinasi (2004) and Schinasi (2005) proposed that capital adequacy risk was one of the possible sources of financial instability. In this study, risk capital adequacy risk simultaneous with other variables affected systemic risk despite its statistic insignificance of t-test.

Table 3 showed that the bank run positively and negatively affected and, in Indonesia Islamic banking, only positively affected systemic risk. Bell (2000) employed a bank run as the main indicator of the banking crisis. This was in line with Kaminsky (1999) proposing that bank run preceded banking crises. Hauben, Kakes and Schinasi (2004) and Schinasi (2005) proposed that confidence collapse resulting in runs was one of the possible sources of financial instability.

Table 3 exhibited that contagion positively and negatively affected systemic risk. It was the core of systemic risk (Djikman, 2010). Hauben, Kakes and Schinasi (2004) and Schinasi (2005) stated that contagion was one of the possible sources of financial instability. In this study, contagion was eliminated from the equation due to multicollinearity.

**Table 3 : Directional relationship Between systemic risk and other variable from previous study**

<table>
<thead>
<tr>
<th>Name</th>
<th>Credit Risk</th>
<th>Liquidity Risk</th>
<th>Capital Adequacy Risk</th>
<th>Bank Run</th>
<th>Contagion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaminsky and Reinhart (1999,9)</td>
<td></td>
<td></td>
<td></td>
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<td>+</td>
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<tr>
<td>Glick dan Hutchison (1999,36)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Gonzalez dan Hermosillo (1999,48-49)</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edison (2003,57)</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cihak dan Slaeck (2007,22&amp;26)</td>
<td>+/-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moshirian and Wu (2009,25)</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
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<tr>
<td>Poghosyan dan Cihak (2009,20)</td>
<td>+/-</td>
<td></td>
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<tr>
<td>Oet, Bianco, Gramlich Ong (2013,13&amp;14)</td>
<td>+/-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfiana, Erni, Sutisna, Dian (2015a,1)</td>
<td>+/-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfiana, Erni, Sutisna, Diam(2015b,1)</td>
<td>+/-</td>
<td></td>
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<td></td>
<td>+/-</td>
</tr>
<tr>
<td>Alfiana (2015c,1)</td>
<td>+/-</td>
<td></td>
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<tr>
<td>Alfiana (2016a,1)</td>
<td>+/-</td>
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<tr>
<td>Alfiana (2016b,1)</td>
<td>+/-</td>
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<td></td>
<td>+/-</td>
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<tr>
<td>Alfiana, Vincentia, Aryanti (2016c,1,)</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Alfiana, Ernie, Sutisna, Dian (2016d,1)</td>
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<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
Conclusion

During the study period, credit risk, liquidity risk, capital adequacy risk, bank run and contagion variables and systemic risk fluctuated along with the study period. All variables simultaneously and significantly affected systemic risk, but only credit risk, liquidity risk, capital adequacy risk and the bank run variables were passed the multilinearity test. Liquidity risk and bank run positively affected Indonesian Islamic banking.

Practitioners of Islamic banking, Bank Indonesia and the government expectedly paid attention and maintained endogenous risks within their management reach to avoid and alleviate systemic risk given its difference from systemic risk in conventional banking. Researchers and observers were advisable to look for other factors affecting systemic risk by taking data availability into account since this study only accounted for 30.07% of systemic risk and other factors affected the rest.
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