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Department of Management

FACULTY OF ECONOMICS AND BUSINESS
Universitas Muhammadiyah Yogyakarta

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Khon Kaen University, Thailand

The 4rd International Conference on Management Sciences 2018 (ICoMS 2018)

March 28 2018

Universitas Muhammadiyah Yogyakarta, Indonesia

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ROOM D   **:** Prof. Dr. Heru Kurnianto Tjahjono, M.M.

ROOM E   **:** Dr. Arni Surwanti, M.Si.

Preface IcoMS 2018

The 4rd International Conference on Management Sciences 2018 (ICoMS 2018)

March 28 2018

Universitas Muhammadiyah Yogyakarta, Indonesia

Dear Presenters and Delegates,

Department of Management, Economics Faculty, University of Muhammadiyah Yogyakarta, in collaboration with the Tamkang University Taiwan, Khon Kaen University Thailand, USIM Malaysia, organized an International Conference which will be held on March 28 2018.

We are proud to know that tehre is a thick manuscript submissions came to our table for this conference. In detail, there are 42 international academic manuscripts which we received from Indonesia, Malaysia, Thailand. And in this conference we choose **Disruptive Innovation in Modern Business Era** as the main theme.

Our international conference is a manifestation of the Government of Indonesia through the Directorate General of Higher Education, which has encouraged the internationalization of research and teaching in order to foster high-caliber academic institutions globally and increase competitiveness in International Higher Education.

We are very confident that our presenters and delegates will get a lot of ideas together and experience of this conference. In addition, our participants will enjoy additional insight from our plenary session keynote speakers, namely, Prof.Dr.Shu-Hsien Liao from Tamkang University Taiwan, Dr. Kawpong Polyorat from Khon Kaen University Thailand, Prof. Dr. Syadiyah Abdul Shukor from USIM Malaysia, and Punang Amaripuja, S.E., S.T., M.IT. from Universitas Muhammadiyah Yogyakarta.

Through this conference, we are committed to promote and improve our mission and academic culture synthesize global progress with local knowledge. Therefore, it is my great honour to welcome you to IcoMS 2018 in great cultural city of Yogyakarta, Indonesia. I look forward to seeing you soon in the conference.

Best wishes,

Dr. Indah Fatmawati

Chair of IcoMS 2018

http://icoms.umy.ac.id/call-for-papers

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Marginal Expected Shortfall Analysis in Banking Emerging Market ASEAN

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ABSTRACT

This study aims to measure the contribution of systemic banking risk in each ASEAN emerging market country for comparison purpose at the time of crisis and thereafter. By being able to measure systemic risk exposure, the Bank or policy maker can make an ultimate risk management plan and the ability to anticipate risks. Moreover, in terms of banking system integration plan through ASEAN Banking Integration Framework (ABIF), central bank and regulator need to consider the impact of systemic risk as a result of the integration banking system.

The research was conducted by using capital shortfall approach with marginal expected shortfall (MES) methodology. Systemic risk contribution calculations were performed using market data in the 2008-2016 observations period. The results found that during the 2008 crisis period all banks and countries were significant and contributed to systemic risk and MES could be a good predictor of systemic risk. While in the period after the crisis, several factors can be a cause of systemic risk in respective country.

Keywords: Emerging Market, Capital Shortfall, Marginal Expected Shortfall, Systemic Risk

1. INTRODUCTION

The main drivers of diversification by commercial banks according to the authors [1,2] are caused by tight competition and regulatory changes that cause banks to be more active and innovative in increasing profits or revenues to provide returns to shareholders. Regulations such as fluctuating changes in interest rate policy caused bank margins to also experience instability and limit the space for banks to maximize profits. The policies that limit the activities of banks is not too important because the freedom to provide various services can help banks compete more effectively [3]. As a result of competition and regulatory changes, income diversification is one of the strategies of a bank's management to generate stable revenues to achieve the goal of increasing shareholder returns.

The argument that bank management adapts to these barriers by expanding its business strategy through offering wider financial products to its customers [4]. Therefore the bank seeks to increase revenue beyond traditional activities by expanding, improving, developing banking products, restructuring and diversifying revenue through non-interest income.

As the current composition of commercial bank revenues not only derived from traditional activities but also derived from a combination of traditional and non-traditional activities, particularly non-interest income is often associated with an increase in banking risk exposure. Previous research has found that diversification with non-interest income causes bank income to be more volatile and riskier [4,5,6]. Due to the shifting structure of the current composition of bank income, the level of income concentration will decrease, along

with the non-traditional level of bank activity that increases so that the
bank's income increase from the non-interest income component, such as the investment bank, actually the bank also increases the potential risk faced [7,8]. It is also revealed that although non-interest income may increase return to shareholders but non-interest income is not strong enough to offset additional risks [9].

While the change in income concentration is a global phenomenon, non-interest income trends also increased against some countries in Asia Pacific especially in the period after the crisis. Some countries in Asia Pacific non-interest income was found to increase in the period after the 2008 crisis, even Singapore generated 40.86% non-interest income on its total income in 2012. In Asia Pacific, the cooperation between countries in an integrated banking system has been initiated by the Association of Southeast Asian Nations (ASEAN) in the form of ASEAN Banking Integration Framework (ABIF), a framework of cooperation between countries incorporated in ASEAN with the aim of reducing the gap by opening access the banking of each State to create an integrated banking system. But an integrated banking system will create strong interconnectedness and financial linkage so that it has potential for systemic risk [10]. Because systemic risk can have an impact on financial stability in a country or region, the regulator or central bank needs to monitor the risks that can occur due to the diversification of income.

The importance of the non-interest income component was the focus of this study with the aim of confirming non-interest income relationships with systemic banking risk. This research is conducted with the aim as a preventive and anticipatory step on the potential indication of systemic risk occurrence in a banking system. By anticipating the occurrence of systemic risks it can create economic and financial stability conducive to a particular country or region.

2. NON-INTEREST INCOME AND SYSTEMIC RISK

Income diversification trend increased after the financial crisis in 2007-2008. Banks tend to diversify incomes due to the strong banking competition climate as well as to increase revenues amid the financial crisis, making it difficult for banks to depend only on one main source of revenue. So some banks diversify their income by doing non-traditional activities. These activities generate income beyond interest income or through non-interest income. The authors [11] categorize non-interest income as non-core activities such as investment bank, venture capital and trading activities.

The authors [4] in his study found that banks that expanded with non-interest income activities had a higher risk level than banks whose main activity was intermediary activities. Increased risk is due to volatile income that becomes volatile and unstable as the authors [6] found that non-interest income is often associated with increased volatility in bank earnings and stock market tail risk.

Non-interest income has attracted the attention of various observers as research materials with a wide range of research focus, but still little research on the impact of non-interest income diversification explicitly examines the effect of non-interest income in the ASEAN region and reviews the impact of banking integration on the region to financial stability.

Research on the impact of diversification began to be done by using size or income structure as a proxy with the assumption that financial institutions, especially banks, which have large assets have the flexibility to diversify some sources of income should be able to make operating income to be stable and generate a stable profit as well, since non-interest income activities are assumed not to correlate with interest income [12]. Although not correlated, according to the author [13] the growth of non-interest income is actually more volatile than the growth of interest income, because trading revenue (which is one component of non-interest income) is very

volatile and covariance both increasingly disguised. The authors [9] point out that high non-interest income can lead to a worsening risk and return trade-off scheme but otherwise diversification of non-interest income makes it possible to increase trade-offs between risk and return with records that non-interest income and interest income have a negative correlation or weak correlation [13].

2.1 Measurement of bank income concentration

The level of income diversification concentration is measured to determine the extent to which banks diversify. Determining the level of income diversification concentration is carried out to determine the impact of diversification on rising bank risk. The authors [14] said banks with low concentration levels have higher levels of non-traditional business activity with high shareholder returns. In other words, a less concentrated bank means having more sources of revenue and better in increasing shareholder returns, but at the same time can increase systemic risk, otherwise high-concentrated banks are more stable and reduce volatility in profit.

In this study Herfindahl-Hirschman Index (HHI) was used for concentration measurement because it can measure the concentration of banking as a whole in a system compared to measure concentration in country-level so that with HHI got picture about full information index. The measurement of HHI uses the total non-interest income of each bank in the statement of profit and loss. HHI is modeled by the following equation:

$$HHI = \sum_{i=1}^{k} s_i^2 \qquad (1)$$

The value of HHI will reach the minimum when all banks in the market have the same size, and reach a value of 1 in the monopoly market.

2.2 Systemic risk definition and related literature

Systemic risk is defined as a failure of one or several financial institutions as the impact of systemic events in the form of shocks that can affect financial institutions or shocks spreading in on a system simultaneously. Systemic risk is defined as a possibility when an institution experiences a distress situation in which the situation can trigger other institutions in the banking industry into distress and cause bank run conditions and disrupt the banking financial system [15].

If an institution or regional has found indications of systemic risk in a financial system, with one or more institution experiencing liquidity problems that requiring government assistance as a lender of last resort, the government will provides a bail-out option or liquidity assistance cash injections to banks or financial institutions that fail because of the potential to disrupt financial stability. As a consequence, the State bears the cost of recovery of systemic risk using funds from the state's cash reserves or using funds from the Guarantee Agency that has levied contributions for banks or financial institutions belonging to Systemically Important Financial Institution (SIFI). The majority of bailout banks in the author [16] research sample received an injection of capital from the Government in exchange or acquisition of ownership of the bank. The purpose of the bailout is to save the bank from bankruptcy and limit the negative consequences in the banking sector. In recent years, the type of institution that has been rescued by the government is a bank belonging to SIFI.

2.3 Diversification, non-interest income and bank risk

Several studies related to income diversification and non-interest income to bank risk have been done several times since the trend of non-interest income increased. Authors [9] conducted a study of commercial banks in the United States stating that high rates of non-interest income are associated with a worsening

risk-return trade off on bank risk so as not to bring significant benefits to the bank. In addition, non-interest income also contributes to the increased volatility of bank earnings that potentially increases systemic risk due to the volatility. They also found well-managed banks to expand more slowly and increased non-interest income was associated with weaker risk-return trade-off effects and suggested that non-interest income be companion (not to replace) and interest income as activity major in generating revenue. Similar results were also raised by author [13] reliance on non-interest income (especially trading income) is associated with higher risk and decreased risk-adjusted profits and less clear benefits from shifting to non-interest income.

While European research on non-interest income found that banks in Europe may be willing to generate lower interest income from loans as the main product to establish long-term relationships with debtor companies, with the aim of generating revenue lost through increased fee income [4]. Study in Bank income structure and risk also found that banks that expand their income with non-interest income give higher risk compared to banks that perform traditional intermediation activities [4]. The authors [8] also conducted research with non-interest income objects found that banking strategies that rely on non-interest income or non-deposit funding dominance are at risk, consistent with the diminishing investment sector in the United States. The authors [11] stated that after describing the total non-interest income into two main components, trading income - investment bank and venture capital income, found that both components are significantly related to systemic risk.

3 EMPIRICAL METHODOLOGY

In line with the objectives of the study, to determine the impact of non-interest income and integration of systemic risk in the ASEAN regional banking industry through stock returns and stock indexes, this research method uses a market-based approach as recommendation from Basel Committee for Banking Supervision.

3.1 Measurement of systemic risk

Measuring capital shortfall can be done with market-based approach where by calculation using market-based has the advantage that is forward-looking where stock price movement can reflect the condition of capital of an institution [17,18]. Forward-looking is an approach used by regulators in compiling the Basel II framework. By using market data, capital shortfall will be measured with Marginal Expected Shortfall (MES). MES process is market return and bank return processed by bivariate process and stated respectively as r_{mt} and r_{it}[19].

$$r_{mt} = \sigma_{mt}\epsilon_{mt}$$
$$r_{it} = \sigma_{it}\rho_{it}\epsilon_{mt} + \sigma_{it}\sqrt{1 - \rho_{it}^2}\xi_{it}$$

$$(\epsilon_{mt}, \xi_{it}) \sim F \qquad (2)$$

So that we conclude the entire MES process of a future period in the following equation [19]:

$$MES_{i,t} = E_t\left(r_{i,t+1} | r_{m,t+1} < q_{a,t}(r_{t+1}) = C\right)$$

$$= \sigma_{it}E_{t-1}(\rho_{it}\epsilon_{mt} + \sqrt{1} - \rho_{it}^2\xi_{it}|\epsilon_{mt} < \frac{C}{\sigma_{mt}}$$
$$= \sigma_{it}\rho_{it}E_{t-1}\left(\epsilon_{mt}\middle|\epsilon_{mt} < \frac{C}{\sigma_{mt}}\right) +$$
$$\sigma_{it}\sqrt{1 - \rho_{it}^2}E_{t-1}(\xi_{it}|\epsilon_{mt} < \frac{C}{\sigma_{mt}} \quad (3)$$

3.2 Herfindahl-hirschman index measurement

Herfindahl-Hirschman Index (HHI) has been widely used in previous studies. However, for the object of cross-country research, the HHI concentrations in this study proxied by using the non-interest income of each bank sample on the balance sheet report. To measure the HHI index, the overall sample will be divided into two sub-samples namely High Concentration (HighConc) and Low Concentration (LowConc). The calculation of concentrations used as in author [14] was calculated by calculating the annual median HHI of all bank samples. Banks with values above the median HHI will be classified as HighConc otherwise

below the median will be grouped into LowConc.

3.3 Sample data

In line with the objective of this research, to know the impact of non-interest income and integration of systemic risk in ASEAN banking industry, this research uses research object at bank in ASEAN-5 (Singapore, Malaysia, Indonesia, Thailand and the Philippines). The election of ASEAN-5 may represent the banking conditions in ASEAN with an asset capacity exceeding 50% of the existing banking assets in ASEAN. The sample banks have been go public and listed on each ASEAN country's stock exchanges which are samples of the research to conform to the methodology approach which is market-based approach. The selected bank samples in this study used banks with the largest asset size in each sample of the research country because systemic risk arose through large financial institutions [14] and banks with large assets tended to diversify sources of income [8] therefore the selected bank samples must be able to meet at least 50% of banking assets in each country in order to obtain research results that can represent the condition of banking in the country. Unlike large-asset banks, banks with small assets are not included in the sample because some previous studies have proven to be insignificant to risk changes [20]. In addition, the sample of banks with large assets has a relationship with bank risks by assumption too big too fail and will be determined the sequence of systemic risk contributions based on SRISK in an integrated banking system to find out which banks have the strongest and weakest systemic risk contribution in an integrated banking system based on the income concentration category [21,22].

3.4 Research steps

Systemic risk index calculation requires equity, debt or leverage data and MES for each bank. Equity and leverage databases are ready for use, whereas for MES it takes time-series estimates of the MSCI stock market index data and each bank. Step of analysis begins with stationary tests on stock market data, both index

and bank, using the root test unit with Augmented Dickey-Fuller test (ADF test). Furthermore, stock market data is converted into the form of return or first difference to get stationary data series and re-tested with ADF test to find out whether there is a series of units root. The next steps is divided into three main activities namely

- The first step is to estimate with GARCH to obtain conditional variance or standard deviation and standardized residual by using Threshold-ARCH or TARCH.
- In the second step is the estimated conditional correlation with DCC to examine volatility correlation among index MSCI and each bank [19].
- The next estimate is to analyze the tail expectations of the standardized residuals of each previous process using tail of each bank and MSCI market index then the equations used as in authors [19]

4 EMPIRICAL RESULT

4.1 Herfindahl-hirschman index concentration

The index of banking income concentration in ASEAN is prepared using Herfindahl-Hirschman Index (HHI) with non-interest income proxy. This proxy is used in order to know the classification of bank concentration based on non-interest income. Concentrations are categorized into two parts: High-Concentration (HighConc) for banks with low non-interest income and Low-Concentration (LowConc) vice versa (Appendix. Figure 2). From the research sample, total HHI Index was obtained 1.052 to 24 samples of bank research in ASEAN so that median of total HHI index obtained was 7.15 for each bank. Bank with a HHI index less than the median is categorized as HighConc otherwise bank with a median above that value is categorized as LowConc.

4.2 Analysis of Estimated Variables

Measuring Marginal Expected Shortfall requires estimation of variables before it can be calculated capital adequacy of each bank. For

that first step is to estimate the variables needed, among others, is the estimation of volatility, correlation and tail-distribution or expectations of standardized residual.

Volatility Analysis

All returns are estimated with first difference and are static at first level and accept null hypothesis that there is no root unit at first difference. While the TARCH model (p, q) uses the TARCH order (1,1), which in the order is the best model of the adjusted R-squared, AIC, SIC, HIC and likelihood log analysis.

Graphic 1: Volatility correlation MSCI index to HighConc Bank (continued)

(LowConc) show a positive and significant value that can be interpreted that leverage effect affect the movement of bank stock prices with Siam Commercial Bank (SCB.BK) as the most affected sample of negative news. Post-examination of residual check was tested using heteroschedastic test with null hypothesis variable not containing ARCH effect Overall sample LowConc showed significant p-value results except in BRI Bank. While high concentration bank output (HighCon) has one bank with negative value to gamma leverage effect and not significant that is Hong Leong Bank of Singapore (HLSF.SI), while the rest shows positive result in gamma coefficient but only two banks are not significant that is Public Bank Malaysia (PUBM.KL) and Hong Leong Bank Malaysia (HLCB.KL).
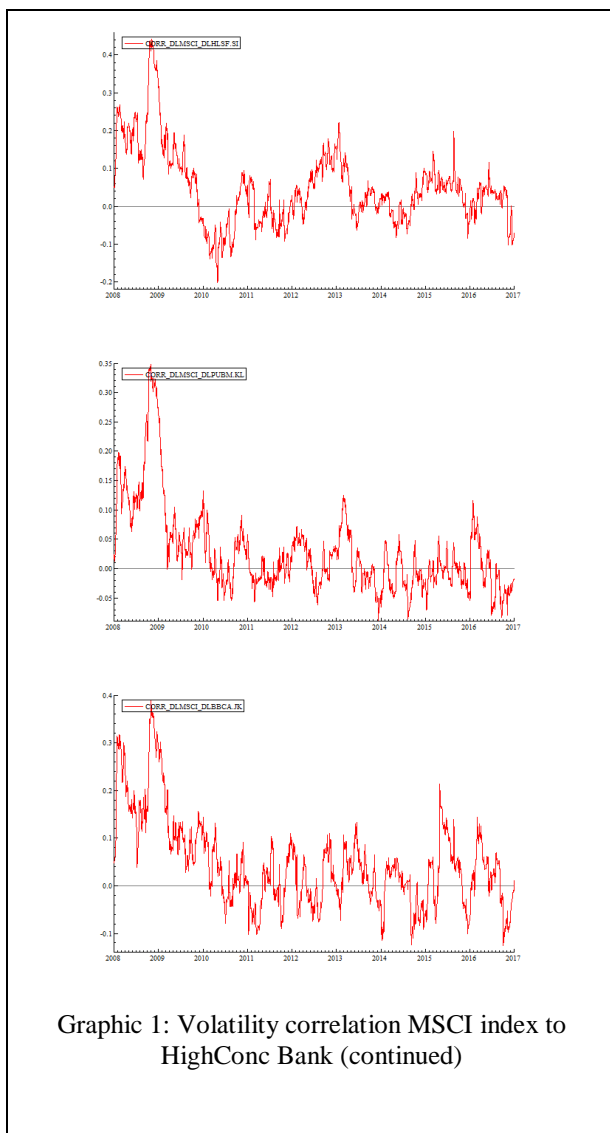
The results of estimation of alpha, beta and gamma coefficients show that all coefficients of banks with low concentration subcategory

Graphic 2: Volatility correlation MSCI index to LowConc Bank
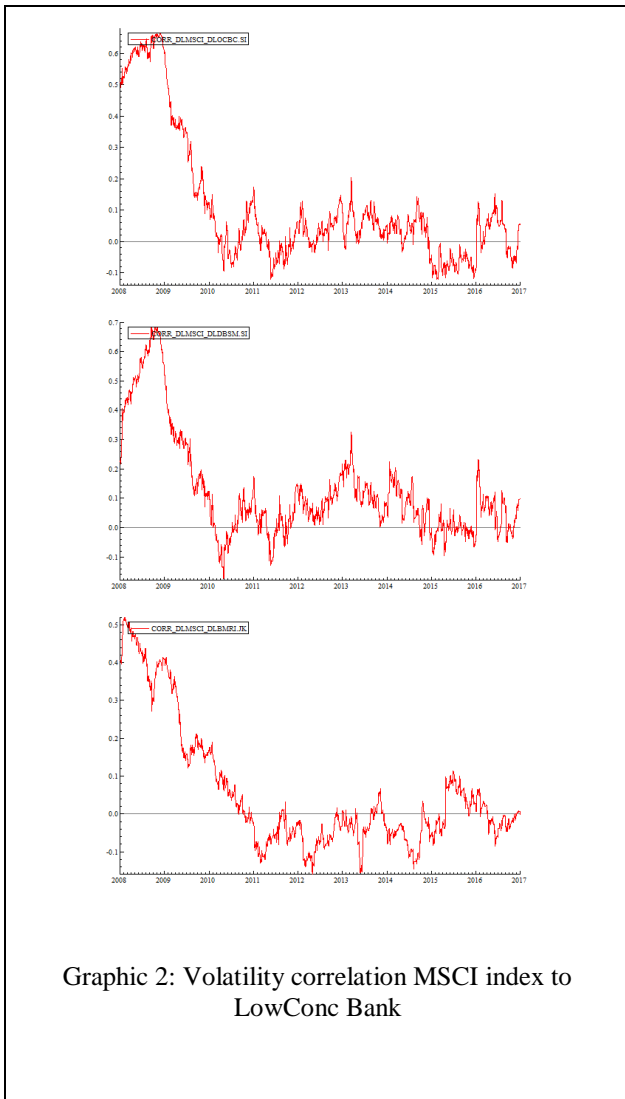
Correlation Analysis

The LowConc category bank meets the positivity constraint assumption and the alpha + beta <1 terms are met the requirement. The LowConc category also shows that the majority of banks in this category have a high correlation-targeting in the sense that the movement of bank stock prices is directly proportional to the MSCI regional market index movement.

The highest correlated banks were OCBC Bank, DBS Bank and Bank Mandiri, respectively, while the average correlation in the LowConc category bank was 0.15 over the period. Meanwhile Bank in the HighConc

category has an average correlation of 0.05 against the MSCI Index. Compared with Banks in the *LowConc category, in this classification HighConc bank also has the* same movement with the MSCI index yield but the movement is not as big as the bank in the LowConc.

Expectation of standardized residual analysis

The final estimate for obtaining MESit is to estimate the expectations of the standardized residual. As in the equation (3) standardized residual obtained in each process of estimation of volatility and correlation, therefore for the calculation of tail expectation is done as in the authors [19]

$$E(\epsilon_{mt}|\epsilon_{mt} < k) \text{ dan } (\xi_{it}|\epsilon_{mt} < k) \tag{4}$$

Expectations of standardized residuals can easily be estimated through both residuals but in some cases they are often too large to cause less stable estimates, especially on too short observations [19]. For this reason, smoothing data on the data is not stable through the non-parametric tail expectation estimation of the standardized residuals [23]. The non-parametric tail expectation estimation through the estimator kernel approach is based on 2 important parameters: bandwidth(h) and kernel (k).

Marginal expected shortfall analysis

MES conditions are defined as falling daily market yields with a threshold of 2%. Through index MSCI as market return parameter we found MES condition that met our criteria.

In 2008 has a number of days below the 43-day MES expectation due to global financial crisis conditions in 2008 that have an impact on the MSCI Index's yields which comprise of Asian stock portfolios. In 2009 when the crisis began to subside, the yield below the threshold also declined, accounting for 19 days with a return fell -2%. Overall during the observation period of research that is 2008-2016 there are 113 days
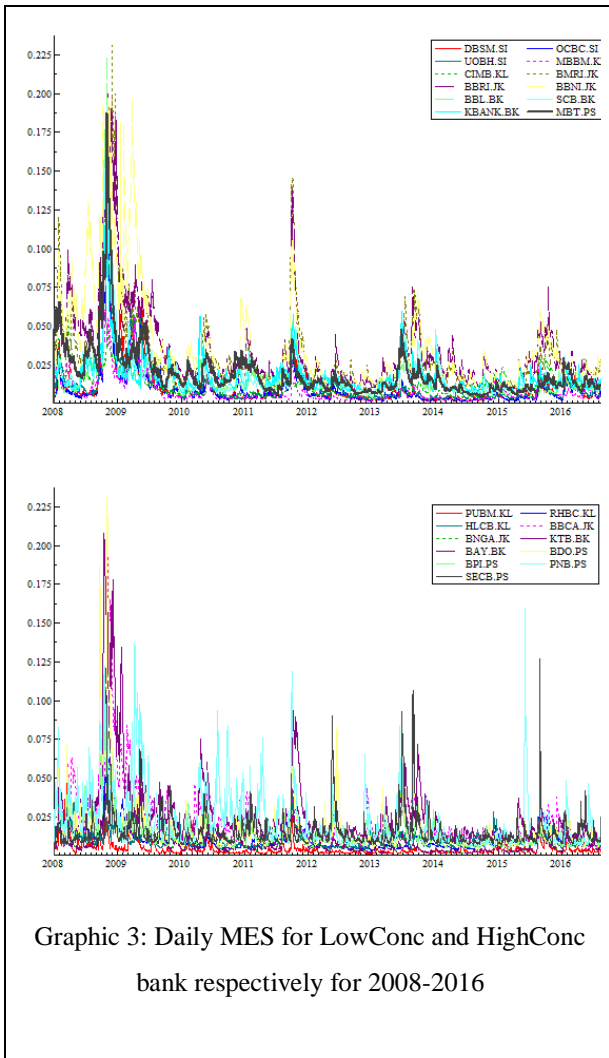
Graphic 3: Daily MES for LowConc and HighConc
bank respectively for 2008-2016

Long-run MES and SRISK contribution analysis

Long-Run Marginal Expected Shortfall or LRMES and SRISK are extensions of MES. LRMES is an estimate of long-term MES for continuous estimation with balance sheet data such as total asset, leverage and market capitalization with quarterly data frequency. $LRMES_{it}$ in one period can be made into quarterly form of daily MES [24]:

$$LRMES_{it} = 1 - exp^{-18*MES_{it}}$$

(5)

Unlike the MES, LRMES is a long-term crisis scenario with market returns falling by 40% in one $LRMES_{it}$ period. While SRISK is a systemic risk index that can be measured after LRMES estimation is carried out with the following equation:

$$SRISK_{it} = kDebt_{it} - (1 - k)(1 - LRMES)Equity_{it}$$

(6)

SRISK is a function of debt (D) or Leverage, the size of financial institution (W) in this study using Market Capitalization and k is the capital adequacy ratio of 8% is the minimum adequacy ratio suggested in BASEL III.

The SRISK calculation of the crisis period was conducted in 2008-2010 with 23 samples of banks listing in ASEAN, but Hong Leong Bank of Singapore (HLSF.SI) was excluded from the sample because it was unable to meet the estimated assumptions in the previous model. In the 2008 crisis period Q1, LowConc's concentrated banks contributed to systemic risk with a 77.3% scale and the remaining 20.7% was contributed by banks with HighConc contributions. The peak of the global crisis occurred Q3 and Q4 of 2008 where in Q3 17 banks (8 LowConc Bank and 9 HighConc bank) had a positive SRISK with SRISK aggregate of 74.004,671,866.00 USD and jumped sharply at Q4 of 385,403,528,790.00 with 22 banks having positive SRISK except Public Bank (PUBM.KL).

In the peak period of the crisis, Bank BRI (BBRI.JK) consistently ranked first with SRISK with 21.8% and 15.5% respectively followed by BCA Bank (BBCA.JK) 14% on Q3 and DBS Bank (DBSM.SI) 10.6% in Q4. Both periods of both HighConc and LowConc categories together have systemic risks in the banking system in ASEAN, which distinguish only the contribution of systemic risk where in the Q3 category LowConc provides 62.7% contribution and 37.3% of the HighConc category while Q4 LowConc category provides 76.9% risk systemic in the system and the HighConc category contributes 23.1%.

From the above analysis, LowConc Bank in the crisis period is the largest systemic risk contributor to HighConc Bank. Consistent as in the authors [9,13] DeYoung and Rice (2003) and Stiroh (2004) studies that non-interest income does not have a risk-return trade-off effect because during the crisis period all banks, both HighConc Bank and LowConc Bank, were significant against SRISK.

Unlike the author [6] study that found changes in the structure of bank risk relations and income composition after the 2008 crisis period led to an increased risk, the condition did not occur in ASEAN after the crisis period. Some banks do have a positive SRISK after the crisis period, but this is due to the fundamentals of the bank. In crisis period LowConc bank is a contributor to systemic risk when there is negative sentiment in the Southeast Asian market, in this case is represented by MSCI index, then SRISK also increases along with market index volatility. This is due to the movement by LowConc banks that move the market or market-driven banks that have influence to several other banks so there is a movement between the market and the bank is linear.

5 CONCLUSION

The change of the post-crisis banking industry in generating income has undergone a transition, especially in banks with large assets. Banks with large assets also tend to diversify incomes because they have large capital to perform non-traditional activities [8]. However, it is in line with previous studies that there is a relationship between the size of banks (asset size) and bank risk especially after the period of financial crisis 2008 [22]. In addition, the assumptions about too big too fail also become polemic in the banking industry where banks with large size (assets) have systemic risk potential. Income diversification also has an impact on income volatility, Author [13] argues that in addition to increasing revenues, non-interest income can also reduce the volatility of income or profit as risk decreases due to stable and non-volatile income, while interest income tends to be more volatile and may lead to more risky banks [7].

The study was conducted to test the diversification of income in banks with large asset capitalization in 5 ASEAN countries to find the impact of income diversification in the banking system in ASEAN region after the crisis period 2008. The study was conducted using Marginal Expected Shortfall [19] with the concentration of income as a proxy measured by the Herfindahl-Hirschman Index [14] method so that the categories of banks in this study are divided into two, Low Concentration (LowConc) is a bank with high non-interst income and High Concentration (HighConc) banks with highly concentrated income or non-interest income below the median samples of the study.

The study was conducted with a market-based approach using the prices of bank stocks traded on individual stock markets as well as MSCI market indices as benchmark measurements. In line with the objective of the study to determine the impact of diversification of bank earnings after the crisis period, the sample research taken from 2008-2016, when 2008-2009 is the peak of the global financial crisis, while in 2010-2012 period where banks and banking systems began recovery from crisis and 2013-2016 is the period of banks after the crisis. Through Marginal Expected Shortfall in the post-crisis period 2008-2016, the findings can be summarized:

1) The entire sample, except Hong Leong Bank Singapore (HLSF.SI), has volatility affected by asymmetric information, in this case Leverage or Debt. LowConc Bank and HighConc Bank both share the same volatility movement patterns during the crisis period, but HighConc Bank peaked at its highest volatility during the 2008 crisis. In contrast to Author [13} opinion that non-interest income growth is more volatile, research results shows that HighCon Bank is more volatile in the observation period. This is because non-interest income in Author [13] research resulted from trading revenue, while the majority of non-interest income in the sample of this research bank is generated through transaction fee, gain on mark-to-market financial assets and derivative transactions. The results of this study also confirm previous research that diversification with non-interest income led to more volatile and more risky bank revenues during the crisis period [4,5,6].

2) Correlation of each bank with MSCI market index estimated by DCC-Engle found that LowConc Bank and HighConc Bank have strong correlation with market index of MSCI during crisis period 2008-2009 and downward trend in recovery period after crisis. However, from each category, LowConc Bank has an average correlation of 0.15 while HighConc Bank is 0.05 during 2008-2016. From these indications indicate that there is a strong relationship between MSCI index and non-interst income.

3) MES condition, where MSCI decline -2% market index, was found for 43 days in 2008 and 19 days in 2009. In that year, Lowconc and HighConc MES graphs sharply and declined during the 2010-2012 recovery period in line with the number day each 7 days, 11 days and 5 days. In the year 2013-2016 after the crisis, tends to decline but returns up significantly in 2016 as much as 10 days.

4) Long-Run MES or LRMES is a long-term MES which is calculated quarterly to be estimated along with the leverage data of each bank. LRMES is one of the components in the SRISK calculation whereby all estimates are found that during the crisis period all banks with large assets in the peak period of the 2008-2009 crisis had a positive SRISK and dominated by LowConc Bank except Public Bank Malaysia (PUBM.KL) SRISK negative. While in the recovery period after the crisis HighConc Bank is more likely to contribute greatly to systemic risk while LowConc Bank only significant SRISK when MSCI market index also experienced shocks.

In this study it can be concluded that non-interest income can also increase systemic risk. Even if the bank has combined revenue between interest income and non-interst income during the crisis period, almost all banks have a positive contribution to SRISK. This result is consistent that non-interest income is significant against systemic risk increase, which is demonstrated by LowConc bank, that is a contributor to systemic risk during the 2008-2009 crisis [11,14]. An increase in non-interest income after the crisis period is found to have no significant impact unless the bank has fundamental problems such as the fall of market capitalization due to individual bank health indicators or an increase in bank debt due to changes in interest rates.

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7 APPENDIX

Figure 1: Statistic Descriptive Bank's return within 2008-2016

	N	Mean	Maximum	Minimum	Std. Dev.
Singapura					
DBS	2349	3.87E-05	0.052883	-0.063737	0.012277
OCBC	2349	-0.000131	0.043879	-0.057176	0.011396
UOB	2349	-1.52E-05	0.049636	-0.065683	0.012624
Hong Leong Bank	2349	-0.000296	0.051419	-0.066626	0.010172
Malaysia					
Maybank	2349	-0.000270	0.058985	-0.065570	0.011158
Hong Leong Bank	2349	6.00E-05	0.060915	-0.089521	0.014598
CIMB	2349	-0.000651	0.126187	-0.084608	0.014917
Public Bank	2349	4.08E-05	0.047302	-0.054579	0.008479
RHB Bank	2349	-0.000440	0.101701	-0.082798	0.014617
Indonesia					
Bank Mandiri	2349	0.000123	0.121361	-0.154151	0.022755
BCA	2349	0.000299	0.087011	-0.088293	0.017773
BRI	2349	0.000259	0.121361	-0.139762	0.023352
BNI	2349	-1.54E-05	0.102654	-0.146603	0.023202
CIMB Niaga	2349	-0.000737	0.287682	-0.287682	0.038072
Thailand					
Bangkok Bank	2349	-5.90E-05	0.088224	-0.082616	0.016336
Kasikorn Bank	2349	0.000112	0.097036	-0.074270	0.018508
Krung Thai Bank	2349	-6.21E-05	0.117783	-0.112478	0.020691
SCB	2349	0.000139	0.087473	-0.090972	0.018298
Bank of Ayudhya	2349	0.000176	0.261645	-0.246133	0.023426
Filipina					
BDO Unibank	2349	0.000397	0.098643	-0.088030	0.017146
BPI	2349	0.000187	0.065241	-0.081313	0.015143
Metrobank	2349	0.000102	0.056451	-0.085677	0.017109
PNB	2349	-0.000168	0.110904	-0.143724	0.019073
Security Bank	2349	0.000670	0.096638	-0.139270	0.019126

Figure 2: List of sample bank in ASEAN

No	Ticker	Bank	Country	Concentration
1	DBSM.SI	DBS Bank	Singapore	LowConc
2	OCBC.SI	OCBC Bank	Singapore	LowConc
3	UOBH.SI	UOB	Singapore	LowConc
4	MBBM.KL	Maybank	Malaysia	LowConc
5	CIMB.KL	CIMB	Malaysia	LowConc
6	BMRI.JK	Bank Mandiri	Indonesia	LowConc
7	BBRI.JK	Bank BRI	Indonesia	LowConc
8	BBNI.JK	Bank BNI	Indonesia	LowConc
9	BBL.BK	Bangkok Bank	Thailand	LowConc
10	SCB.BK	Siam Commercial Bank	Thailand	LowConc
11	KBANK.BK	Kasikornbank	Thailand	LowConc
12	MBT.PS	Metropolitan Bank and Trust	Philippines	LowConc
13	HLSF.SI	Hong Leong Bank Singapore	Singapore	HighConc
14	PUBM.KL	Public Bank	Malaysia	HighConc
15	RHBC.KL	RHB Bank	Malaysia	HighConc
16	HLCB.KL	Hong Leong Bank Malaysia	Malaysia	HighConc
17	BBCA.JK	Bank Central Asia	Indonesia	HighConc
18	BNGA.JK	CIMB Niaga Bank	Indonesia	HighConc
19	KTB.BK	Krungthai Bank	Thailand	HighConc
20	BAY.BK	Bank of Ayudhya	Thailand	HighConc
21	BDO.PS	BDO Unibank	Philippines	HighConc
22	BPI.PS	Bank of the Philippine Islands	Philippines	HighConc
23	PNB.PS	Philippine National Bank	Philippines	HighConc
24	SECB.PS	Security Bank Philippines	Philippines	HighConc

Figure 3: Variabel description and data source

Variabel	Measurement	Variable Descr	Data Requirement	Source
Concentration	Herfindhal-Hirschman Index (HHI)		Total Asset (each Bank and each country)	Bankscope / Orbis
Non Interest Income			Noninterest income/ Total Operating Income	Bankscope / Orbis
SRISK	MES	Market Capitalization	Closing Stock Price x Shares Outstanding	Datastream
		Market Leverage	(Asset - Equity + Market Equity) / Market Equity	Bankscope / Orbis
		Market return	Log market closing price	Datastream
		Stock Return	Log stock closing price	Datastream
Country Sample Indonesia		Stock Return Bank	Log Stock Price	Datastream
Singapore		Stock Return Bank	Log Stock Price	Datastream
Malaysia		Stock Return Bank	Log Stock Price	Datastream
The Phillipines		Stock Return Bank	Log Stock Price	Datastream
Thailand		Stock Return Bank	Log Stock Price	Datastream

Figure 4: SRISK Contribution in 2008-2009

2008Q1	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BMRI.JK	LowConc	1	19.94%	16,361,357,757.08	2,476,907,600.43	7,046,736,003.57
BBRI.JK	LowConc	2	19.82%	16,262,833,381.96	504,019,978.28	8,346,158,223.13
CIMB.KL	LowConc	3	14.38%	11,801,671,252.48	2,669,662,329.80	10,491,240,162.65
BBCA.JK	HighConc	4	6.71%	5,508,997,373.53	104,262,432.14	8,613,191,328.99
BBNI.JK	LowConc	5	6.45%	5,291,341,118.83	819,793,376.76	2,282,135,671.66
BNGA.JK	HighConc	6	5.62%	4,612,533,495.77	367,360,260.59	1,002,251,971.01
DBSM.SI	LowConc	7	4.68%	3,836,846,953.98	7,659,837,256.61	19,868,762,236.27
UOBH.SI	LowConc	8	4.25%	3,487,088,194.47	4,508,863,702.41	21,189,799,231.69
MBT.PS	LowConc	9	3.88%	3,187,194,357.13	1,753,596,144.64	1,731,100,909.96
BDO.PS	HighConc	10	2.98%	2,441,436,466.26	1,604,016,235.63	2,866,504,558.72
BAY.BK	HighConc	11	2.33%	1,911,626,849.09	2,087,769,292.09	4,244,725,514.46
BPI.PS	HighConc	12	1.91%	1,563,617,657.84	130,524,526.47	3,432,680,874.69
RHBC.KL	HighConc	13	1.64%	1,345,127,995.00	1,389,223,298.03	3,219,771,817.33
MBBM.KL	LowConc	14	1.52%	1,245,369,488.12	4,724,960,289.86	12,901,032,874.57
SCB.BK	LowConc	15	1.34%	1,099,636,837.89	1,675,807,589.29	5,484,863,477.93
KBANK.BK	LowConc	16	1.07%	877,622,111.48	1,776,979,687.50	6,868,412,543.69
KTB.BK	HighConc	17	0.63%	518,825,291.91	1,665,923,875.00	3,600,620,691.96
PNB.PS	HighConc	18	0.60%	490,635,369.05	434,186,590.04	451,963,807.61
HLCB.KL	HighConc	19	0.24%	199,589,563.50	1,606,437,518.91	1,462,086,305.91
SECB.PS	HighConc	20	0.00%	(72,140,504.07)	377,386,970.07	524,460,939.91
PUBM.KL	HighConc	21	0.00%	(104,073,906.06)	1,481,954,957.77	11,600,007,194.24
BBL.BK	LowConc	22	0.00%	(2,273,593,519.83)	1,209,315,752.55	8,217,276,488.84
OCBC.SI	LowConc	23	0.00%	(4,062,509,877.88)	4,031,531,531.53	18,191,273,227.77
			100%	82,043,351,515		

2008Q2	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BBRI.JK	LowConc	1	31.19%	16,427,528,334.16	612,451,003.80	6,753,277,183.40
BBCA.JK	HighConc	2	14.96%	7,882,404,270.66	107,654,259.36	6,555,717,452.20
BMRI.JK	LowConc	3	14.06%	7,404,044,692.71	1,716,334,129.14	5,839,102,346.74
BNGA.JK	HighConc	4	12.49%	6,577,737,451.89	407,608,247.42	1,301,349,438.06
BBNI.JK	LowConc	5	10.22%	5,381,607,281.25	513,744,438.42	1,985,529,390.89
CIMB.KL	LowConc	6	6.76%	3,562,091,323.97	2,953,374,100.72	8,259,498,928.02
BDO.PS	HighConc	7	2.71%	1,424,983,536.16	1,837,664,062.50	2,209,540,277.30
BAY.BK	HighConc	8	2.32%	1,222,111,425.51	2,561,095,862.49	3,806,876,916.84
SCB.BK	LowConc	9	1.90%	1,002,217,085.40	2,619,275,943.68	4,416,662,068.98
MBT.PS	LowConc	10	1.45%	762,498,149.37	1,910,585,982.14	1,331,247,512.28
PNB.PS	HighConc	11	0.68%	359,271,880.35	374,469,151.79	436,077,109.87
HLCB.KL	HighConc	12	0.50%	265,019,470.44	1,648,517,360.03	1,509,021,206.74
BPI.PS	HighConc	13	0.46%	240,243,003.88	177,994,947.32	2,596,022,739.67
KTB.BK	HighConc	14	0.19%	101,096,094.78	3,099,678,620.13	2,830,104,225.58
RHBC.KL	HighConc	15	0.11%	60,006,323.85	1,620,345,949.33	2,783,358,192.96
KBANK.BK	LowConc	16	0.00%	(96,812,086.43)	2,092,227,381.67	5,090,517,486.61
SECB.PS	HighConc	17	0.00%	(102,649,966.21)	413,458,125.67	426,385,054.15
BBL.BK	LowConc	18	0.00%	(576,382,359.83)	2,243,884,931.10	6,805,042,072.68
MBBM.KL	LowConc	19	0.00%	(3,799,869,298.98)	1,679,607,048.46	10,539,637,718.22
PUBM.KL	HighConc	20	0.00%	(5,143,851,052.44)	1,838,948,238.90	11,250,239,019.91
UOBH.SI	LowConc	21	0.00%	(5,509,725,970.30)	4,660,586,894.17	20,868,568,358.83
DBSM.SI	LowConc	22	0.00%	(6,831,307,050.02)	8,840,920,791.35	21,093,790,703.32
OCBC.SI	LowConc	23	0.00%	(10,626,538,774.88)	4,637,052,290.95	18,786,526,611.05
			100%	52,672,860,324		

Figure 4: SRISK Contribution in 2008-2009 (continued)

2008Q2	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BBRI.JK	LowConc	1	31.19%	16,427,528,334.16	612,451,003.80	6,753,277,183.40
BBCA.JK	HighConc	2	14.96%	7,882,404,270.66	107,654,259.36	6,555,717,452.20
BMRI.JK	LowConc	3	14.06%	7,404,044,692.71	1,716,334,129.14	5,839,102,346.74
BNGA.JK	HighConc	4	12.49%	6,577,737,451.89	407,608,247.42	1,301,349,438.06
BBNI.JK	LowConc	5	10.22%	5,381,607,281.25	513,744,438.42	1,985,529,390.89
CIMB.KL	LowConc	6	6.76%	3,562,091,323.97	2,953,374,100.72	8,259,498,928.02
BDO.PS	HighConc	7	2.71%	1,424,983,536.16	1,837,664,062.50	2,209,540,277.30
BAY.BK	HighConc	8	2.32%	1,222,111,425.51	2,561,095,862.49	3,806,876,916.84
SCB.BK	LowConc	9	1.90%	1,002,217,085.40	2,619,275,943.68	4,416,662,068.98
MBT.PS	LowConc	10	1.45%	762,498,149.37	1,910,585,982.14	1,331,247,512.28
PNB.PS	HighConc	11	0.68%	359,271,880.35	374,469,151.79	436,077,109.87
HLCB.KL	HighConc	12	0.50%	265,019,470.44	1,648,517,360.03	1,509,021,206.74
BPI.PS	HighConc	13	0.46%	240,243,003.88	177,994,947.32	2,596,022,739.67
KTB.BK	HighConc	14	0.19%	101,096,094.78	3,099,678,620.13	2,830,104,225.58
RHBC.KL	HighConc	15	0.11%	60,006,323.85	1,620,345,949.33	2,783,358,192.96
KBANK.BK	LowConc	16	0.00%	(96,812,086.43)	2,092,227,381.67	5,090,517,486.61
SECB.PS	HighConc	17	0.00%	(102,649,966.21)	413,458,125.67	426,385,054.15
BBL.BK	LowConc	18	0.00%	(576,382,359.83)	2,243,884,931.10	6,805,042,072.68
MBBM.KL	LowConc	19	0.00%	(3,799,869,298.98)	1,679,607,048.46	10,539,637,718.22
PUBM.KL	HighConc	20	0.00%	(5,143,851,052.44)	1,838,948,238.90	11,250,239,019.91
UOBH.SI	LowConc	21	0.00%	(5,509,725,970.30)	4,660,586,894.17	20,868,568,358.83
DBSM.SI	LowConc	22	0.00%	(6,831,307,050.02)	8,840,920,791.35	21,093,790,703.32
OCBC.SI	LowConc	23	0.00%	(10,626,538,774.88)	4,637,052,290.95	18,786,526,611.05
			100%	52,672,860,324		

2008Q4	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BBRI.JK	LowConc	1	15.46%	59,598,035,868.62	426,492,073.73	5,147,103,728.92
DBSM.SI	LowConc	2	10.57%	40,749,450,785.72	7,297,070,544.64	13,430,560,431.06
UOBH.SI	LowConc	3	10.53%	40,574,328,472.00	10,338,957,561.4	13,765,775,375.80
BBCA.JK	HighConc	4	10.51%	40,521,222,255.57	45,918,617.51	7,311,289,598.16
BMRI.JK	LowConc	5	8.09%	31,165,945,528.09	1,309,369,032.26	3,862,551,776.10
OCBC.SI	LowConc	6	8.06%	31,067,688,484.15	4,201,586,380.48	10,907,894,780.73
BBNI.JK	LowConc	7	6.98%	26,900,077,352.53	851,785,161.29	947,688,179.85
SCB.BK	LowConc	8	5.49%	21,177,369,601.99	2,374,265,715.93	4,722,459,647.38
BBL.BK	LowConc	9	4.38%	16,878,173,684.51	1,991,571,440.51	3,792,403,100.66
BAY.BK	HighConc	10	3.73%	14,388,665,487.14	2,358,308,931.14	1,626,534,317.51
BNGA.JK	HighConc	11	3.60%	13,890,468,225.08	397,873,917.05	1,081,039,625.47
KBANK.BK	LowConc	12	2.43%	9,368,665,002.45	3,980,376,887.64	3,100,970,592.72
MBBM.KL	LowConc	13	2.17%	8,370,159,886.54	1,585,073,819.21	7,215,608,608.70
CIMB.KL	LowConc	14	1.66%	6,415,421,790.62	2,806,006,976.74	6,067,175,739.13
BDO.PS	HighConc	15	1.47%	5,674,706,368.11	1,509,531,843.10	1,165,340,305.08
BPI.PS	HighConc	16	1.41%	5,430,904,081.00	143,749,227.51	2,635,740,501.16
RHBC.KL	HighConc	17	1.14%	4,396,809,474.01	1,648,638,662.79	2,434,363,043.48
MBT.PS	LowConc	18	1.08%	4,156,470,423.45	1,563,668,578.66	876,760,072.77
KTB.BK	HighConc	19	0.99%	3,801,042,498.54	2,887,532,689.43	1,223,237,725.31
PNB.PS	HighConc	20	0.12%	474,016,934.94	444,449,768.03	195,558,802.45
HLCB.KL	HighConc	21	0.07%	250,645,465.29	1,556,436,918.60	1,214,497,576.81
SECB.PS	HighConc	22	0.04%	153,261,119.65	167,074,371.15	173,668,897.38
PUBM.KL	HighConc	23	0.00%	(1,205,653,241.87)	2,076,206,666.67	6,342,110,086.96
			100%	385,403,528,790		

Figure 4: SRISK Contribution in 2008-2009 (continued)

2009Q1	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BNGA.JK	HighConc	1	18.50%	23,978,103,376.39	368,406,068.49	965,486,958.02
DBSM.SI	LowConc	2	13.39%	17,357,288,065.41	7,372,536,136.66	12,666,342,841.75
BBCA.JK	HighConc	3	12.86%	16,666,056,007.29	43,094,061.6	6,559,707,262.42
BBRI.JK	LowConc	4	10.78%	13,969,134,012.52	526,912,440.40	4,444,950,098.83
BMRI.JK	LowConc	5	8.96%	11,618,329,936.75	1,273,950,671.87	3,902,300,298.13
UOBH.SI	LowConc	6	8.40%	10,880,893,278.17	4,289,750,328.52	9,732,332,010.51
BBNI.JK	LowConc	7	8.12%	10,526,050,181.12	644,309,406.16	943,846,102.78
OCBC.SI	LowConc	8	4.82%	6,247,854,897.52	3,837,056,504.60	9,942,560,498.08
SCB.BK	LowConc	9	4.34%	5,627,967,799.38	2,394,150,028.20	5,185,765,004.82
CIMB.KL	LowConc	10	2.14%	2,767,756,108.66	3,038,837,101.45	6,727,925,625.39
MBBM.KL	LowConc	11	1.88%	2,436,845,847.48	3,127,913,323.12	7,499,253,296.46
BBL.BK	LowConc	12	1.23%	1,589,154,666.68	2,772,405,724.76	4,010,400,327.21
KBANK.BK	LowConc	13	0.94%	1,220,017,488.05	3,191,128,905.81	3,020,259,267.82
MBT.PS	LowConc	14	0.82%	1,062,580,029.71	2,069,708,736.25	975,077,881.30
RHBC.KL	HighConc	15	0.69%	888,690,530.86	1,644,255,072.46	2,092,588,937.69
BAY.BK	HighConc	16	0.68%	883,797,226.78	2,271,935,532.99	1,498,836,937.01
KTB.BK	HighConc	17	0.56%	731,368,820.68	3,427,067,624.65	1,431,360,983.08
BPI.PS	HighConc	18	0.52%	669,130,080.54	314,930,409.11	2,290,006,740.53
BDO.PS	HighConc	19	0.25%	321,268,398.60	1,418,036,314.59	1,218,133,074.40
PNB.PS	HighConc	20	0.10%	133,357,752.73	347,276,966.18	161,473,117.10
SECB.PS	HighConc	21	0.02%	23,199,078.67	184,973,704.09	228,949,592.23
HLCB.KL	HighConc	22	0.00%	(270,141,533.40)	1,602,823,188.41	1,352,444,205.33
PUBM.KL	HighConc	23	0.00%	(1,778,698,220.91)	2,012,529,783.15	5,123,861,487.78
			100%	129,598,843,584		

2009Q2	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
DBSM.SI	LowConc	1	15.79%	26,059,048,413.75	7,261,608,623.55	18,603,240,988.25
BBRI.JK	LowConc	2	13.27%	21,903,904,203.54	826,051,862.75	7,541,442,454.41
UOBH.SI	LowConc	3	11.55%	19,058,922,755.78	4,216,417,910.4	15,458,338,225.54
BNGA.JK	HighConc	4	9.64%	15,910,523,889.99	413,274,509.80	1,440,315,619.05
BMRI.JK	LowConc	5	9.47%	15,619,372,665.26	1,145,052,450.98	6,458,589,388.66
OCBC.SI	LowConc	6	8.67%	14,308,136,226.36	3,834,991,708.13	14,742,612,686.43
BBNI.JK	LowConc	7	6.96%	11,485,077,375.93	576,641,568.63	2,549,849,598.10
BBCA.JK	HighConc	8	6.30%	10,392,050,597.52	59,316,568.63	8,435,276,313.53
MBBM.KL	LowConc	9	5.80%	9,572,837,575.48	3,630,887,790.70	11,886,766,780.53
BAY.BK	HighConc	10	3.45%	5,684,963,213.73	2,626,220,376.32	2,587,399,657.21
SCB.BK	LowConc	11	1.70%	2,799,194,112.77	2,474,539,417.74	7,214,983,649.06
KBANK.BK	LowConc	12	1.64%	2,713,698,427.15	2,354,518,493.24	4,657,858,043.07
MBT.PS	LowConc	13	1.17%	1,924,431,039.79	2,243,520,141.34	1,183,308,761.69
KTB.BK	HighConc	14	1.14%	1,878,408,586.37	4,004,381,496.77	2,873,760,392.19
BBL.BK	LowConc	15	1.10%	1,812,824,399.14	2,722,627,745.01	6,056,258,300.59
BDO.PS	HighConc	16	0.99%	1,632,604,855.20	1,380,100,062.36	1,507,254,808.18
CIMB.KL	LowConc	17	0.50%	831,928,580.57	3,088,735,931.92	9,228,771,633.93
PNB.PS	HighConc	18	0.50%	831,920,196.74	322,115,277.49	271,863,580.15
BPI.PS	HighConc	19	0.23%	386,978,669.92	305,817,098.98	2,834,147,554.52
HLCB.KL	HighConc	20	0.06%	105,897,841.63	1,572,370,299.20	1,480,408,175.35
SECB.PS	HighConc	21	0.06%	97,573,242.52	252,955,564.75	287,518,588.11
RHBC.KL	HighConc	22	0.00%	(492,378,871.42)	1,582,145,209.99	2,537,827,070.88
PUBM.KL	HighConc	23	0.00%	(2,778,851,981.62)	2,296,246,512.95	6,369,128,778.82
			100%	165,010,296,869		

Figure 4: SRISK Contribution in 2008-2009 (continued)

2009Q3	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BBRI.JK	LowConc	1	38.34%	19,753,277,086.59	1,418,029,045.64	9,499,690,962.14
BBCA.JK	HighConc	2	13.05%	6,723,193,044.11	71,586,203.32	11,710,489,982.37
BMRI.JK	LowConc	3	12.32%	6,348,440,602.42	1,086,213,381.7	10,116,142,558.64
BNGA.JK	HighConc	4	11.61%	5,983,616,350.19	414,750,726.14	1,720,628,684.24
BBNI.JK	LowConc	5	7.98%	4,113,504,523.63	802,613,692.95	3,333,252,318.27
BAY.BK	HighConc	6	6.23%	3,212,386,160.58	2,537,255,312.78	3,490,678,238.32
SCB.BK	LowConc	7	4.63%	2,384,863,485.85	2,053,321,730.02	8,647,312,605.60
BBL.BK	LowConc	8	1.89%	975,434,498.13	2,080,780,963.78	6,913,199,346.72
KBANK.BK	LowConc	9	1.31%	674,075,756.26	2,412,768,392.70	5,909,726,606.48
MBT.PS	LowConc	10	1.19%	615,321,214.83	2,320,199,305.99	1,463,299,053.10
KTB.BK	HighConc	11	1.05%	540,468,749.72	3,674,510,536.67	3,028,336,679.14
PNB.PS	HighConc	12	0.31%	158,235,063.23	367,276,508.94	327,292,934.30
SECB.PS	HighConc	13	0.08%	39,220,234.02	332,187,753.73	377,483,501.29
BDO.PS	HighConc	14	0.00%	(107,794,453.59)	1,340,177,371.19	1,670,244,517.44
UOBH.SI	LowConc	15	0.00%	(524,306,465.19)	4,345,449,382.37	18,155,707,454.21
HLCB.KL	HighConc	16	0.00%	(636,651,772.34)	1,680,781,668.09	1,637,436,207.00
RHBC.KL	HighConc	17	0.00%	(775,106,455.69)	1,615,932,820.95	3,156,437,771.03
BPI.PS	HighConc	18	0.00%	(876,351,424.20)	763,167,304.09	3,072,489,583.91
DBSM.SI	LowConc	19	0.00%	(1,360,559,101.75)	6,511,429,788.44	21,516,117,024.79
OCBC.SI	LowConc	20	0.00%	(3,021,402,601.92)	4,157,319,324.15	17,799,529,396.03
CIMB.KL	LowConc	21	0.00%	(3,111,227,780.07)	3,102,247,651.58	11,495,977,016.48
MBBM.KL	LowConc	22	0.00%	(3,586,646,504.86)	4,255,013,623.19	13,607,570,670.71
PUBM.KL	HighConc	23	0.00%	(4,606,357,207.08)	1,950,751,084.13	7,290,531,830.01
			100%	51,522,036,770		

2009Q4	Income Concentration	Rank	SRISK (%)	SRISK (USD)	Total Debt (USD)	Market Cap (USD)
BNGA.JK	HighConc	1	27.45%	9,641,021,221.65	401,674,840.76	1,784,073,771.62
BBRI.JK	LowConc	2	20.44%	7,178,735,616.99	1,932,218,577.49	9,906,887,464.74
BMRI.JK	LowConc	3	14.55%	5,111,856,975.53	1,289,680,891.7	10,347,035,947.35
BBCA.JK	HighConc	4	9.80%	3,442,574,959.69	77,530,042.46	12,553,661,371.37
SCB.BK	LowConc	5	7.67%	2,692,527,735.68	1,715,144,391.12	8,849,776,407.22
BAY.BK	HighConc	6	7.11%	2,495,965,077.57	2,896,186,029.69	4,101,687,704.31
BBNI.JK	LowConc	7	4.69%	1,647,321,956.58	591,274,416.14	3,174,971,175.81
KBANK.BK	LowConc	8	4.00%	1,403,969,770.04	2,368,648,889.62	6,105,255,594.39
KTB.BK	HighConc	9	2.70%	947,022,197.23	3,619,911,467.31	3,304,937,804.62
MBT.PS	LowConc	10	1.35%	475,903,765.85	2,529,644,779.33	1,751,607,166.70
SECB.PS	HighConc	11	0.19%	65,705,044.14	219,017,029.06	486,885,552.32
PNB.PS	HighConc	12	0.07%	23,569,035.36	285,693,218.51	345,885,493.50
HLCB.KL	HighConc	13	0.00%	(107,886,971.51)	1,880,059,265.68	2,295,046,545.88
BDO.PS	HighConc	14	0.00%	(219,692,209.88)	1,174,747,039.83	1,965,345,076.24
BBL.BK	LowConc	15	0.00%	(523,063,230.57)	2,403,196,099.88	6,645,431,443.70
BPI.PS	HighConc	16	0.00%	(888,625,618.61)	711,066,687.70	3,356,378,886.41
RHBC.KL	HighConc	17	0.00%	(1,094,981,974.71)	1,799,567,215.96	3,335,306,107.54
PUBM.KL	HighConc	18	0.00%	(6,187,646,903.76)	2,347,266,218.59	8,164,094,798.36
CIMB.KL	LowConc	19	0.00%	(6,256,333,372.91)	3,211,926,568.37	13,251,863,074.23
UOBH.SI	LowConc	20	0.00%	(8,153,803,520.33)	8,217,307,336.51	21,366,698,783.18
MBBM.KL	LowConc	21	0.00%	(8,703,270,232.80)	4,419,588,800.44	14,189,060,017.53
OCBC.SI	LowConc	22	0.00%	(10,348,159,345.71)	4,883,927,986.91	21,013,729,862.16
DBSM.SI	LowConc	23	0.00%	(10,537,699,017.20)	6,131,075,215.26	25,012,285,800.33
			100%	35,126,173,356		