The Stability Comparison between Islamic Banks and Conventional Banks: Evidence in Indonesia

Gamaginta[1] and Rofikoh Rokhim[2]

This study aims to determine the stability of Islamic banking and its comparison with conventional banking in Indonesia. In this case, the level of bank stability is measured individually using one of accounting-based bank soundness measurement called the Z-score indicator. Using the parametric statistical t-test, the study shows that the level of stability comparison between Islamic banks and conventional banks are significantly different. This research uses the sample data of 12 Islamic banks and 71 conventional banks in Indonesia during the period of 2004-2009. The results show that the Islamic banks in general have a lower degree of stability compared to the conventional ones. Some exclusion includes the tendency that small Islamic banks relatively have the same degree of stability with small conventional banks. During the crisis period of 2008-2009, Islamic banks and conventional banks tended to have the same relative degree of stability. Interestingly, the stability of full-fledged Islamic banks (BUS) is lower than Islamic business units (UUS).

Key words: Islamic Bank, Conventional Bank, Stability, Z-Score, *t-test*

1. Introduction

Islamic banking has grown rapidly both in size and number in many countries around the world (Sundararajan and Errico, 2002). Although the total assets of Islamic banks internationally are still very small compared to the whole world's total banking assets, its growth rate is phenomenal, especially in the Middle East and Southeast Asia (Karwowski, 2009). In some countries, Islamic banking and other forms of Islamic finance have become systemically important and in many cases they are considered as "too big to be ignored" (Hasan and Dridi, 2010).

In Indonesia, the development of Islamic banking also indicates an impressive growth trend. As an illustration, the data from Bank Indonesia (BI) shows that the total assets held by the national Islamic banking industry had increased by almost 37 times from Rp 1.79 trillion in 2000 to Rp 66.1 trillion by the end of 2009. Asset growth rate recorded 34.2% per year (average annual growth in 2005-2009). For the period of 2007-2008, average growth reached 36.2%, higher than the average growth of regional Islamic banking assets (Southeast Asia) that was only around 30% for the same period (Bank Indonesia, 2009a). For the record, the average annual growth in total assets held by the banking industry recorded 14.8% per year, where growth in 2009 only reached 9.7%, which is the lowest growth over the last five years.

[1] Gamaginta is student of the Graduate School of Banking and Finance, Department of Management, Faculty of Economics, Universitas Indonesia and also works at Indonesia Eximbank in Sharia Financing Division.
[2] Rofikoh Rokhim is lecturer in Banking & Finance and Head of the Management Research Center, Department of Management, Faculty of Economics, Universitas Indonesia.

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Correspondence: the Management Research Center, Department of Management Building 2nd Floor, Faculty of Economics, Universitas Indonesia, Depok, West Java, 16424, Indonesia. Phone: +62-21-7270164. Fax: +62-21-78849155. Email: rofikoh.rokhim@ui.ac.id

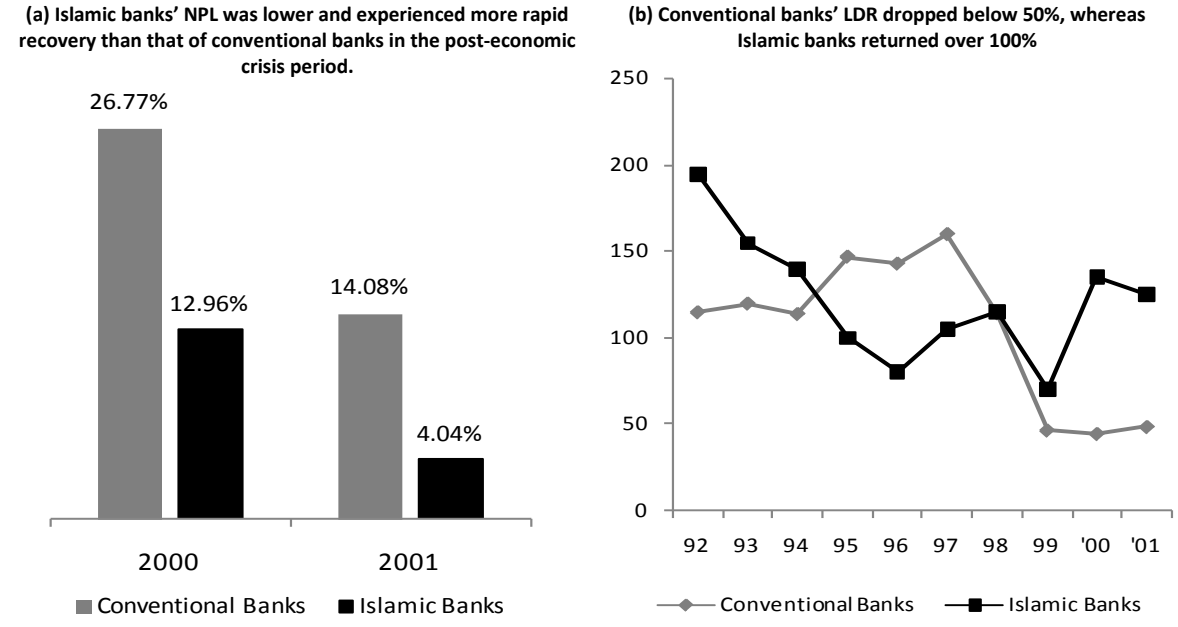
Table 1
The Growth of Islamic Banking in Indonesia.

Descriptions	2005		2006		2007		2008		2009		Average Growth
	Total	Growth	Total	Growth	Total	Growth	Total	Growth	Total	Growth	
Asset (Rp trillion)	20.9	37.4%	26.7	28.0%	36.5	36.7%	49.6	35.6%	66.1	33.4%	34.2%
Financing (Rp trillion)	15.2	34.8%	20.4	34.2%	27.9	36.7%	38.2	36.7%	46.9	22.8%	33.0%
Third Party Funds (Rp trillion)	15.6	33.2%	20.7	32.6%	28.0	35.5%	36.9	31.6%	52.3	41.8%	35.0%
Profit/Loss (Rp billion)	282	68.9%	389	37.9%	595	53.0%	528	-11.3%	904	71.2%	43.9%
FDR (%)	97.8		98.9		99.8		103.7		89.7		
NPF (%)	2.8		4.8		4.1		4.0		4.0		

Source: Bank Indonesia

Along with this strong growth, a broad view of Islamic banking resilience has arisen. Islamic banking is considered as an alternative of banking institutions that are resistant to shocks in macroeconomic conditions or financial market. Based on the data from Bank Indonesia (2002), after the monetary crisis period of 1997-1998, it was claimed that the Islamic banks in Indonesia had a relatively better recovery compared to conventional banking institutions as indicated by the relatively low non-performing financing (NPF) ratio and there was no occurrence of negative spread in their operations. The data also indicates that Islamic banks were relatively more capable of channeling funds to the production sector with the financing to deposit ratio (FDR) returning to the level over 100%, while conventional banks' loan to deposit ratio (LDR) dropped below 50%.

Figure 1
Islamic Banking Performance in Indonesia 2000 – 2001.



Source: Bank Indonesia

Throughout the recent global financial crisis, the Islamic banking industry in Indonesia has also demonstrated resilience, evidenced by relatively high growth performance of this industry and a fairly stable level of NPF. However, there are two factors considered "shielding" the Islamic banks from the direct impact of shocks in the global financial system ie. the exposure of Islamic banking financing was still more geared to the domestic economy

and therefore, the level of integration with the global financial system and the sophistication level of transaction were considered low (Bank Indonesia, 2009b).

Despite of its severe impact, the global financial crisis has triggered an increasingly attention questioning the resilience of Islamic banks and their relationship with financial stability. Hasan and Dridi (2010) mentioned that some industry specialists and academics have argued a similar statement as above, but there are others who have argued that some Islamic banks, as well as conventional banks, have relied on leverage and have taken significant risks that make them still vulnerable to the second round effects of the global crisis, for example as happened in highly leveraged countries like the UAE (Dubai) and Qatar.

These arguments reflect a need to better understand the specific characteristics of Islamic banking. Many studies have been developed regarding the inherent risk in Islamic banks but generally discussed in theoretical point of view (Boumediene and Caby, 2009). Moreover, existing theoretical studies have not provided clear view on whether and how banking aspects of Islamic banks, including their stability, differ from conventional banks (Beck et al., 2010). On the other hand, empirical studies have not been developed as well as theoretical studies.

The first empirical study discussing the topic of Islamic banking stability was performed by Čihák and Hesse (2008), in which the stability of Islamic banks are measured with an insolvency-risk indicator and compared to those of conventional banks. This work becomes an important reference used in many other empirical studies, such as Boumediene and Caby (2009), Hasan and Dridi (2010), Imam and Kpodar (2010), and Beck et al. (2010). It also provides an inspiring framework of how the variables of Islamic banks can be compared with conventional banks.

Those papers are conducted using cross-country data observation. Some important things that should be taken into account related to this methodology, the cross-country data should have been treated more carefully since every country has its own regional and developmental backgrounds resulting in different definition of banks (Karwowski, 2009) and different characteristics of banking industry. Moreover, different financial systems that encourage or limit the operation of Islamic banks will also make the data of each country more difficult to compare. Therefore, it is suggested that a cross-country analysis should take appropriate control for heterogeneity across countries to gain reliable conclusions about financial stability and the resilience of the Islamic banking sector (Hasan and Dridi, 2010).

This paper aims to explore the stability of Islamic banks and their comparison with conventional banks in Indonesia. Different from the cross-country studies, this study will focus on the country-level data of Indonesia's banking industry. With this paper, we hope it can be a useful comparison for the existing cross-country studies on Islamic bank stability, and generally, to provide additional insights to the emerging literature of Islamic banking.

The level of bank stability is measured individually using the Z-score indicator, an accounting-based bank soundness measurement. We use the Z-score indicator because the only available data of Islamic banks are in the form of financial statement as no Islamic banks are listed on the stock market. Furthermore, to determine whether the level of stability comparison between Islamic banks and conventional banks is significantly different or not, the parametric statistical *t-test* is applied.

The sample data used in this study cover 12 Islamic banks and 71 conventional banks in Indonesia during the period of 2004-2009. The results show that the Islamic banks in general have a lower degree of stability compared to that of the conventional ones. Some exclusion includes the tendency that small Islamic banks relatively have the same degree of stability

with small conventional banks. During the crisis in 2008-2009, Islamic banks and conventional banks tended to have the same relative degree of stability.

While the empirical study conducted by Čihák and Hesse (2008) only focused on full-fledged Islamic banks' financial data, this paper makes an attempt to examine the stability of Islamic business units opened by conventional banks. The result suggests that the stability of full-fledged Islamic banks (BUS) is lower than that of Islamic bank business units (UUS). However, some notes should be considered and will be discussed later in Section IV and V.

The rest of the paper will be structured as follows: Section II provides a review of the literatures related to the topic of Islamic bank characteristics and their relationship with bank stability. Section III and IV presents the evaluation methodology and the data used in this paper, respectively. Section V explains the findings resulted from the evaluation, and section VI contains the conclusions, as well as some suggestions for further studies.

2. Literature Review

After the period of global financial crisis, the issue of monitoring to the overall soundness and stability of the financial system becomes more prominent, not least also to the Islamic banking industry. With the existence of several characteristics that are different from conventional banking, understanding the behavior of Islamic banks, especially related to the stability of the banking system, should be given more attention.

One basic difference in the operation is that the conventional bank intermediation is generally based on debt and allow the "transfer of risk", while Islamic banks are more likely asset-based and focused on "risk sharing" (Hasan and Dridi, 2010), or widely known as "profit and loss sharing principle". In addition, Islamic law also prohibits Islamic banking from practising transactions that are speculative and no clear underlying, including such instruments that have triggered the recent global financial crisis.

The principle of profit and loss sharing in the literature of Islamic law and economics is seen as the most ideal base from the entire financial transaction. But in practice, the evidence indicates that most financing transactions provided by Islamic banks are not in the form of profit and loss sharing principles (see eg. Aggarwal and Yousef, 2000; Chong and Liu, 2009; Dar and Presley, 2000; Kaleem and Isa, 2003). The results of an empirical studies by Beck et al. (2010) also concludes that the differences between Islamic and conventional banks are smaller than often assumed, but there are certain regulatory and supervisory challenges for countries facing the increasing entry of Islamic banks.
According to Solé (2007), understanding the Islamic banking from the perspective of financial stability is important, at least for two reasons. First, Islamic banks may become systemically relevant as they grow and increasingly interact with conventional banks that are systemically important. Second, the lack of Islamic instruments for hedging results in the concentration risks in a small number of institutions. In many articles, there has been widely argued that Islamic banking has special characteristics that must be recognized and disclosed for the implementation of effective banking supervision (Errico and Farahbakh, 1998), and to develop an optimal operation of Islamic banking in accordance with their characteristics (Bank Indonesia, 2002).

Studies that directly examine the behavior of Islamic banks in the perspective of the banking system stability are pioneered by Čihák and Hesse (2008). They measured the stability of Islamic banks compared to conventional banks in 18 countries with significant Islamic banking industry in the period of 1993-2004. In this study, Čihák and Hesse (2008) found that small Islamic banks tend to be more stable than small conventional banks. On the contrary, large conventional banks tend to be more stable than large Islamic banks, and small

Islamic banks are more stable than large Islamic banks, reflecting the greater credit risk management challenges in large Islamic banks. It is also found that the increasing market share of Islamic banks does not have a significant influence on the stability of other banks.

Another study on this topic was conducted by Boumediene and Caby (2009) observing the stock return of Islamic banks and the conventional ones during the subprime crisis in 2007. The results showed that in the period of crisis, the return volatility of Islamic banks is relatively lower than that of the conventional banks, indicating that Islamic banks are more resistant than conventional banks. This does not conclude that Islamic banks are protected from various risks, but thus showing different risk characteristics with conventional banks necessitating a better understanding and more precise risk management.

Hasan and Dridi (2010) conducted a study to determine the impact of the global financial crisis on the performance of Islamic banks and its comparison with the conventional banks. By using the banking data in Bahrain, Jordan, Kuwait, Malaysia, Qatar, Saudi Arabia, Turkey, and the UAE, the results show that in the aspect of profitability, Islamic banks experienced a significant decline in profitability during the global financial crisis period, although on average still relatively similar to conventional bank profitability. In terms of assets and loans, Islamic banks showed much higher growth in the times of crisis and the assessment of external rating agencies indicates relatively stable ratings for Islamic banks.

Associated with the global market competition, Turk-Ariss (2010a) found that Islamic banking is less competitive compared to conventional banking and while the bank profitability increase significantly in the presence of market power, this does not guarantee a higher level of profitability for Islamic banks. The data observation of this study also indicates that the Islamic banks allocate a larger share of their assets to financing compared to conventional banks, as well as their capital ratios. Beck et al. (2010) concludes the same result that conventional banks operating in countries with a higher market share of Islamic banks are more cost-effective but less stable. They also found consistent evidence that higher capitalization of Islamic banks plus higher liquidity reserves explain the relatively better performance of Islamic banks during the recent crisis.

According to Imam and Kpodar (2010), the finding of Čihák and Hesse (2008) which states that Islamic banks tend to be less stable when operating at large scale shows that under certain conditions, the growing Islamic banking sector may not be beneficial for economic growth because it can weaken financial stability, especially in countries with lack of prudential regulations. Moreover, Imam and Kpodar (2010) argue that Islamic banking is more considered as a complement to the existing conventional banking, and thereby help diversify the systemic risk.

From the above description, the understanding of whether and how the stability of Islamic banks differs from conventional banks has still not result in convergent views. Turk-Ariss (2010a) suggested that further studies are needed to examine whether Islamic banks have a role in contributing to overall financial stability. This becomes an interesting phenomenon to observe and also provides opportunities for future research. It is also important to explore the differences that may exist between full-fledged Islamic banks and Islamic business units in the Islamic banking industry.

3. Evaluation Methodology

According to Borio and Drehmann (2009), the measurement of stability has a distinctive role in the operational framework of the financial system stability to help ensure the accountability of the authorities in charge and to support the implementation of the chosen strategy to achieve the goal in real-time.

Measurements as an instrument of monitoring vary both in methods and indicators being used. Related to the measurement of individual financial institution stability, the existing literature generally classifies financial institutions based on the level of bank soundness, using various financial ratios and other indicators (Čihák, 2007). Banking soundness is a major concern in systemic stability, considering that the banking sector is still the root of the financial services industry in many countries and financial centers because of the large financial transactions through this sector (Sundararajan and Errico, 2002).

In this study, the level of bank stability is measured using the indicator of individual bank soundness, called the Z-score. In the literature of Islamic banking, this indicator is first used empirically by Čihák and Hesse (2008) but also had been discussed theoretically in a study by Mirakhor (1987). The main consideration in the use of this indicator is due to the data of Islamic banks in Indonesia are available only in the form of accounting data from bank financial statements. The Islamic banking market data are not available, since there is no Islamic bank whose stocks are publicly traded[3]. In addition, up to this time, the Z-score as an indicator of the bank stability is widely used in studies, among others, such as De Nicolo et al. (2003), Boyd et al. (2006), Yeyati and Micco (2007), Hesse and Čihák (2007), Čihák and Hesse (2008), Berger et al. (2008), Uhde and Heimeshoff (2009), Demirgüç-Kunt and Detragiache (2009), Čihák et al. (2009), Turk-Ariss (2010b), Beck et al. (2010), etc.

In many articles, the use of the Z-score indicator for the purpose of measuring the bank stability refers to Boy d and Runkle (1993) (see eg. Hesse and Čihák, 2007; Čihák and Hesse, 2008; Demirgüç-Kunt and Detragiache, 2009). It was also raised in the study of Boyd and Graham (1986) and rooted to the article by Roy (1952). The measurement of Z-score is used to indicate the probability of bank failure (Berger et al., 2008) or more specifically to represent the bank insolvency risk which is defined as the probability that losses (negative profits) exceed equity (De Nicolo, 2000) that forces banks to default (Yeyati and Micco, 2007). The definition of Z-score (refers to Yeyati and Micco, 2007) is as follows:

$$P\left(\mathrm{ROA}_{it} \leq -\frac{\mathrm{EQ}_{it}}{\mathrm{A}_{it}}\right) \leq \frac{\sigma^2_{\mathrm{ROA}it}}{\left(\mu_{\mathrm{ROA}it} + \frac{\mathrm{EQ}_{it}}{\mathrm{A}_{it}}\right)^2} \equiv \frac{1}{\mathrm{Z}^2_{it}} \qquad (1)$$

The value of Z in the above equation corresponds with the upper bound of insolvency risk (De Nicolo, 2000). With the assumption that the ROA_{it} is normally distributed, Boyd and Graham (1986) define Z-Score as an indicator of the probability of bank default. But even if ROA_{it} is not normally distributed, Z is the lower bound on the probability of default (by Chebyshev's inequality) so that a higher value of Z-score implies a lower probability of insolvency (Čihák, 2007).

Based on the above explanation, the Z-score Z_{it} is calculated with the following equation:

$$\mathrm{Z}_{it} = \frac{\mu_{\mathrm{ROA}it} + EQ_{it}/A_{it}}{\sigma_{\mathrm{ROA}it}} \qquad (2)$$

where Z_{it} is a proxy variable for the probability of insolvency of the bank *i* at time *t*, ROA_{it} is the ratio of return on assets of bank *i* at time *t*, $\mathrm{EQ}_{it}/\mathrm{A}_{it}$ is the amount of equity to assets ratio of bank *i* at time *t*, and $\mu_{\mathrm{ROA}it}$ is the rate of return on assets of of bank *i* at time *t*, and $\sigma_{\mathrm{ROA}it}$ is

[3] Until this article to be written, the only Islamic bank in Indonesia which operates as a public company is Bank Muamalat Indonesia, but its shares are not traded on the stock exchanges.

the estimated standard deviation of the rate of return on assets as a proxy for return volatility, which are all calculated based on accounting data (Boyd et al., 2006). According to Yeyati and Micco (2007), a smaller Z-score (a greater risk exposure) can be associated with narrower returns (for example, because of larger inefficiencies or reduced market power), a larger return volatility (due to poorer diversification or a less conservative investment option), or a higher level of leverage (due to lower capitalization).

In the cross-sectional analysis, the use of Z-score measurement can be directly implemented. However, if the analysis also includes the time-varying behavior, then μ_{ROAit} and σ_{ROAit} are the moments of the ROA_{it} distribution which must be estimated in the Z-score calculation. The first alternative, μ_{ROAit} and σ_{ROAit} are estimated from the total available sample data, and the second alternative, the two moments are estimated using rolling windows [*t - n, t*] with *n* is a certain time period. The second alternative is the approach widely used in many studies (see eg. Yeyati and Micco, 2007; Demirgüç-Kunt and Detragiache, 2009).

The use of rolling windows [*t - n, t*] is generally tailored to the availability of existing data. For example, Yeyati and Micco (2007) used a three-year period of rolling windows with a frequency of 12 quarterly data, whereas Demirgüç-Kunt and Detragiache (2009) used a rolling windows [*t - 4, t*] with annual frequency sample data. However, the determination of the optimal rolling windows period for the Z-score measurement so far has not been concluded.

In this study, we chose the period of rolling the windows at one last year or four quarters prior to period *t* is [*t - 4, t*] with the following consideration:

1. Banking revenues in Indonesia are generally dominated by the expansion of lending activity and also influenced by the loan quality. It is assumed that in the maximum period of one year, the bank has determined steps towards the settlement of non-performing loans, whether to restructure or write-off (if the reserve is adequate) causing distress on bank earnings that can affect the level of individual bank stability significantly;
2. The bank financial report is published quarterly with each reporting being compared to that achieved in the same period of the previous year.

Another factor that may affect the measurement of Z-score is the calculation reference for ROA_{it}. For the consistency of the measurement, ROA_{it} is defined as annualized earnings before tax divided by average total assets. This refers to the calculation used in the Indonesian Banking Statistics published by Bank Indonesia.

$$ROA_{it}\ on\ year\ k = \frac{Profit\ of\ Bank\ i\ at\ month\ n\ x\ 12/n}{Total\ Asset\ Average\ of\ Bank\ i\ [1\ \&\ n]} \quad (3)$$

The calculation of leverage ratio EQ_{it}/A_{it} is presented in the following equation:

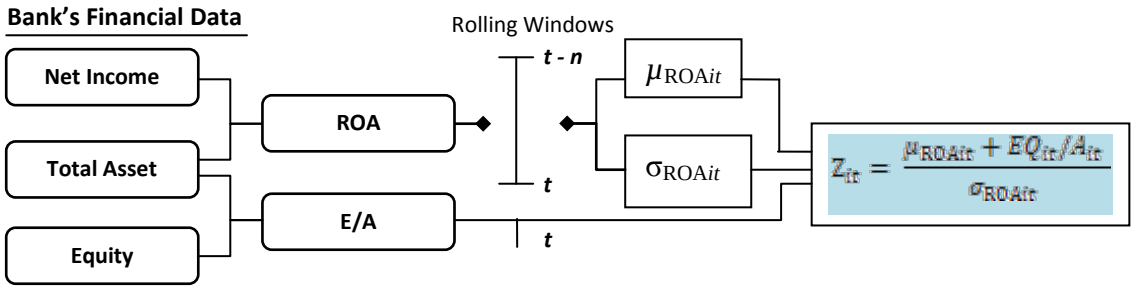
$$EQ_{it}/A_{it}\ on\ year\ k = \frac{Equity\ of\ Bank\ i\ at\ month-n}{Total\ Asset\ of\ Bank\ i\ at\ month-n} \quad (4)$$

where k = 2004, 2005, ..., 2009

n = 1,2, ..., 12 on year k

In general, the stages of Z-score measurement are presented in Figure 2.

Figure 2
The measurement stages of Z-score



According to Čihák (2007), the Z-score as an accounting-based indicator has some limitations as this indicator is highly dependent on the quality of accounting and auditing framework that underlies. In addition, the Z-score has not covered the factor of contagion among institutions within the system and is considered as backward-looking.

However, Čihák (2007) also states that this indicator has the advantage that it can be used for institutions where more sophisticated market data are not available. With the Z-score, the risk of default in different groups of institutions can also be compared. Demirgüç-Kunt and Detragiache (2009) argue that this measure is the improvement of the measures used in the previous studies, such as the ratio of NPL, loan spread, interest margin, and capital adequacy, especially for cross-country studies because each country has different reporting requirements and other specific factors such as market structure, differences in risk-free interest rates and operating expenses, as well as regulatory capital. Other advantages of using this indicator to present the level of bank stability were listed in Čihák et al. (2009).

4. Data

This study focuses on the banking industry in Indonesia with the observation period of 2004-2009. The number of commercial banks as of December 2009 was 121 commercial banks including 6 full-fledged Islamic banks (BUS) and also 25 Islamic business units (UUS) which are treated equally as individual bank separated from their holding. This is a development from the study by Čihák and Hesse (2008) which focuses only on the data of fully operated Islamic banks.

Table 2
The Number of Banks in Indonesia.

Bank Groups	Dec 2004	Dec 2005	Dec 2006	Dec 2007	Dec 2008	Dec 2009
Commercial (all) Banks	133	131	130	130	124	121
Conventional Banks	130	128	127	127	119	115
Full-Fledged Islamic Banks (BUS)	3	3	3	3	5	6
Islamic Business Unit (UUS)	15	19	20	26	27	25

Source: Bank Indonesia

However, not all groups of banks are included in the analysis. The regional development banks (BPD) are removed from the observation given the BPD operations are more regional (province) oriented. This observation is also limited only to banks with the total asset greater

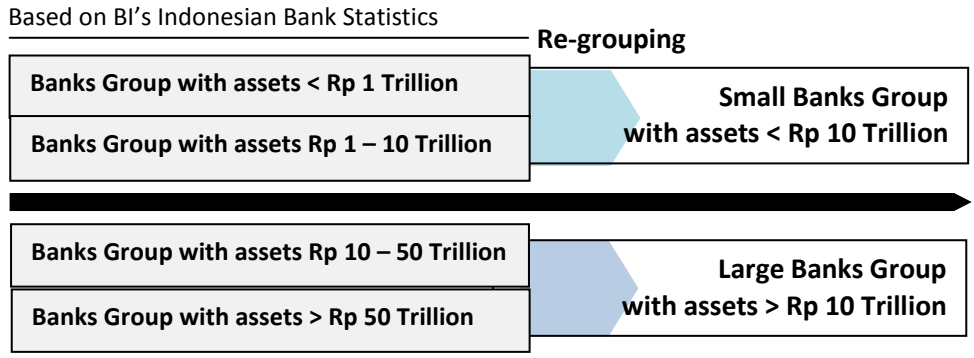
than Rp 1 trillion[4] in the position as of December 2009. This is intended to conform to the minimum capital requirements of BUS and the significance with the total banking assets in Indonesia (an asset value of Rp 1 trillion is equivalent with 0.4% of the total banking assets).

The sample period of 2004-2009 is intended to cover some of the condition of distress; those are the mini crisis in 2005 due to an increase in fuel prices and the global financial crisis in 2008. There are also changes in bank population (see Appendix 1). The observation period begins from 2004 to consider the market share of Islamic banking that has surpassed 1% of the total banking assets in Indonesia.

The financial data used in this study are obtained from the unaudited quarterly financial reports of banks available on Bank Indonesia's official website, the financial statements published on the bank's official websites and the Indonesia Stock Exchange (IDX), as well as from the research data collected by Dwitamia (2009).

Čihák and Hesse (2008) found that with the bank size (total assets) is increasing, the level of stability tends to increase in the group of large banks (with assets of over US$ 1 billion), but the level of stability will tend to decrease in the group of small banks (with assets below US$ 1 billion). Therefore, to determine the effect of bank size more specifically, the data of banks will be grouped into two groups; those are the group of small banks with total assets less than Rp 10 trillion and the group of large banks with total assets more than Rp 10 trillion. As of December 2009, there are only two BUS (Bank Syariah Mandiri and Bank Muamalat Indonesia) whose assets are more than Rp 10 trillion. Their combined assets reach Rp 38,10 trillion, or 57,65% of the total assets of Islamic banking so this is considered adequately to represent the comparison between groups of large banks and small banks.

Figure 3
Bank Grouping Based on Total Assets.



With the predetermined restrictions, as many as 83 samples are obtained, including 71 conventional banks and 12 Islamic banks which consist of 5 BUS and 7 UUS. Based on the total assets, the availability of conventional commercial banks sample data reaches an average of 85.78% of the total assets of commercial banks in the observation period, while the availability of Islamic banks sample data covers an average of 93.11% of the total assets of Islamic banks during the observation period (see Appendix 2).

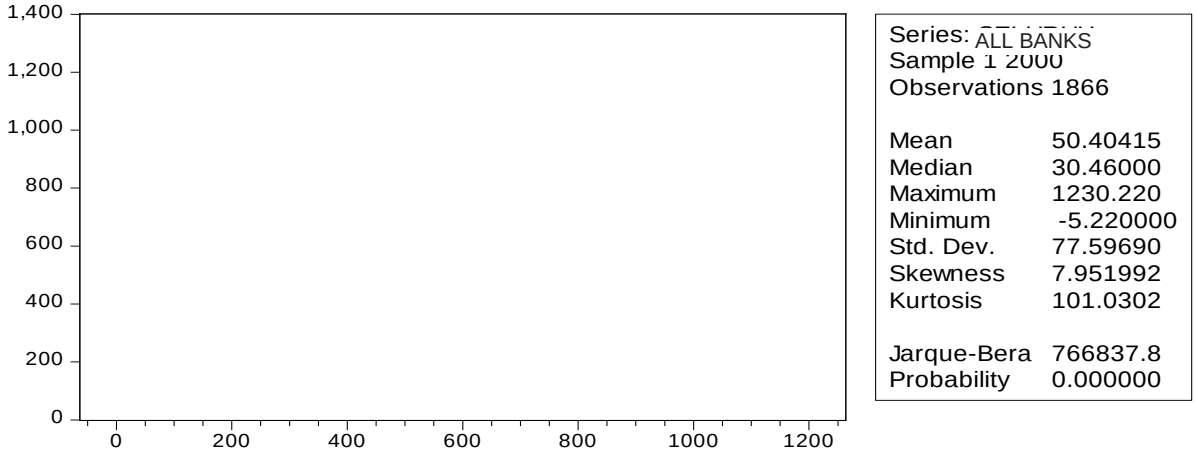
[4] With the average exchange rate of about Rp 9.000 per US$ 1, Rp 1 trillion is equivalent to about US$ 111 million.

Regarding the equity portion of UUS, Bank Indonesia regulation states that the share capital of UUS is not an authorized paid-in capital but only the working capital that the holding conventional banks must set aside in the form of cash and maintained a minimum of Rp 100 billion. But for this study, this working capital will be calculated as a part of UUS's equity besides the current earnings.

5. Findings
6.

The results of Z-score measurement of the overall sample of individual banks within the group of Islamic banks and conventional banks for the observation period of 2004-2009 are presented in the following Figure 4.

Figure 4
The Descriptive Statistic of the Z-Score Measurement (all sample)



Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

The Z-scores of the overall observation data show a high level of variability ranging from -5.22 to 1230.22. Large standard deviation and the median higher than the mean of the sample indicate that there are some data with relatively extreme value of Z-score. The results of Z-score measurement for each group of banks can be found in Table 3.

It can be seen that in the sample of all banks, the Z-score of Islamic banks tend to be lower than the value of Z-score of conventional banks, in terms of mean and median. This also applies to groups of large banks and small banks. If the measurement results between groups are compared, the large Islamic banks show the mean of Z-score which tends to be lower than the small Islamic banks, while the median is larger.

Table 3
The Descriptive Statistics of the Z-score Measurement (between bank groups)

BANK SAMPLE	ALL BANKS		LARGE BANKS		SMALL BANKS	
	ISLAMIC	CONV.	ISLAMIC	CONV.	ISLAMIC	CONV.
Mean	39.213	51.877	33.288	57.341	40.897	47.472
Median	22.160	31.830	22.214	32.489	21.933	30.869
Maximum	317.430	1230.220	133.655	1230.218	317.429	712.044
Minimum	0.170	-5.220	6.456	1.192	0.166	-5.219
Std. Dev.	51.321	80.313	29.115	101.218	56.004	57.926
Skewness	2.930	7.984	2.122	7.810	2.752	4.420
Kurtosis	12.802	98.822	6.781	81.940	11.179	33.235
Jarque-Bera	1179.21	648385.7	64.63272	198581	684.4575	37749.13
Probability	0	0	0	0	0	0
Sum	8509.32	85544.83	1597.811	42202.93	6911.513	43341.85
Sum Sq. Dev.	568916.4	10630018	39840.06	7530202	526917.4	3060127
Observations	217	1649	48	736	169	913

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

On the other side, the large conventional banks show the Z-score value that tends to be higher than the small conventional banks in terms of mean and median, where the maximum value of Z-score is more extreme in the group of large conventional banks and the minimum value of Z-score is more extreme in the group of small conventional banks. Overall, the large conventional banks show the highest mean value of Z-score, while that of the large Islamic banks is the lowest.

The measurement of Z-score is formed by the components of profitability ratios ROA as the proxy of the bank return, equity (leverage) ratio E/A as the proxy of the financial buffer and standard deviation of ROA to indicate the return volatility. This is shown in Table 4 below. It can be seen that in the sample of all banks, although a relatively lower return of Islamic banks can be covered with a higher level of equity compared with the conventional banks, the return of Islamic banks is more volatile. This results in the Z-score value of the Islamic banks that is lower than that of the conventional banks. The same trend can be seen in the group of small banks. While in the group of large banks, the lower Z-score of Islamic banks compared to that of the conventional banks is mainly due to the return and the equity of Islamic banks that are lower than those of conventional banks although the Islamic banks show a better return volatility.

Table 4
The Descriptive Statistic of the Z-Score Components

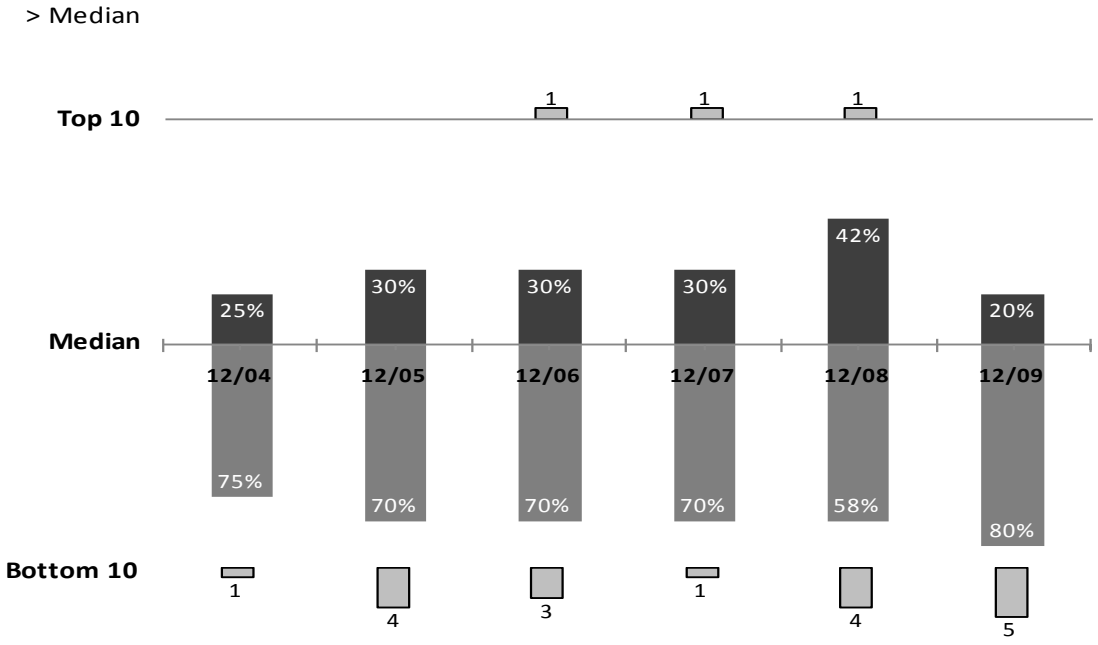
DATA SAMPLE		ALL BANKS		LARGE BANKS		SMALL BANKS	
		ISLAMIC	CONV.	ISLAMIC	CONV.	ISLAMIC	CONV.
ROA	Mean	0.004	0.024	0.021	0.028	-0.002	0.022
	Median	0.014	0.020	0.021	0.024	0.010	0.016
	Maximum	0.074	0.222	0.033	0.222	0.074	0.192
	Minimum	-0.447	-0.619	0.005	-0.069	-0.447	-0.619
	Std. Dev.	0.055	0.033	0.007	0.021	0.061	0.040
	Skewness	-4.986	-5.531	-0.679	2.663	-4.396	-5.901
	Kurtosis	31.123	108.140	0.083	18.593	24.061	89.083
E/A	Mean	0.264	0.168	0.082	0.136	0.316	0.194
	Median	0.228	0.121	0.079	0.112	0.278	0.137
	Maximum	0.895	1.079	0.120	0.689	0.895	1.079
	Minimum	0.003	-0.745	0.056	0.036	0.003	-0.745
	Std. Dev.	0.197	0.138	0.015	0.085	0.194	0.165
	Skewness	1.166	2.549	0.797	2.877	0.984	2.048
	Kurtosis	0.854	10.745	0.175	10.968	0.540	7.207
STDEV ROA	Mean	0.022	0.010	0.005	0.008	0.027	0.011
	Median	0.008	0.005	0.005	0.005	0.010	0.005
	Maximum	0.204	0.297	0.011	0.094	0.204	0.297
	Minimum	0.001	0.000	0.001	0.000	0.001	0.000
	Std. Dev.	0.037	0.021	0.002	0.012	0.040	0.026
	Skewness	2.891	8.617	0.638	4.260	2.475	7.754
	Kurtosis	7.995	99.302	0.635	21.744	5.480	73.498

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

Table 4 also shows that ROA has skewed and extremely heavy-tailed distribution of the observed data so it cannot be considered as normally distributed. But as we have discussed before in Section 3, even if ROA_{it} is not normally distributed, Z is the lower bound on the probability of default so that a higher value of Z-score represents a lower probability of insolvency (Čihák, 2007) and can be used as comparison between groups of data. For other purpose of study, such as econometrical study, the data should be transformed into other forms, such as in the forms of logarithm, square root or inverse (please see page 25).

By using the bank data sample, the position of the stability of each Islamic bank compared to that of conventional banks in each period can be obtained, as shown in Figure 5 below. It can be seen that in each period, the majority of Islamic banks in the observation have a value of Z-score below the median of the overall sample. In the period of 2005-2006 and the period of 2008-2009, there are many Islamic banks located in the bottom 10 group based on the Z-score value. Conversely, there is only one Islamic bank positioned in the top 10 group, and only in the period of 2006-2008. Given the mini-crisis in 2005 and the global financial crisis in 2008, the results obtained show several trends suitability. But whether there is a tendency that the financial distress may impact on the decreasing level of stability of Islamic banks in Indonesia, this needs further study. The details of the position of each bank in the sample based on the level of stability can be seen in Appendix 3.

Figure 5
The Islamic Bank Position of Stability (based on median of all samples)

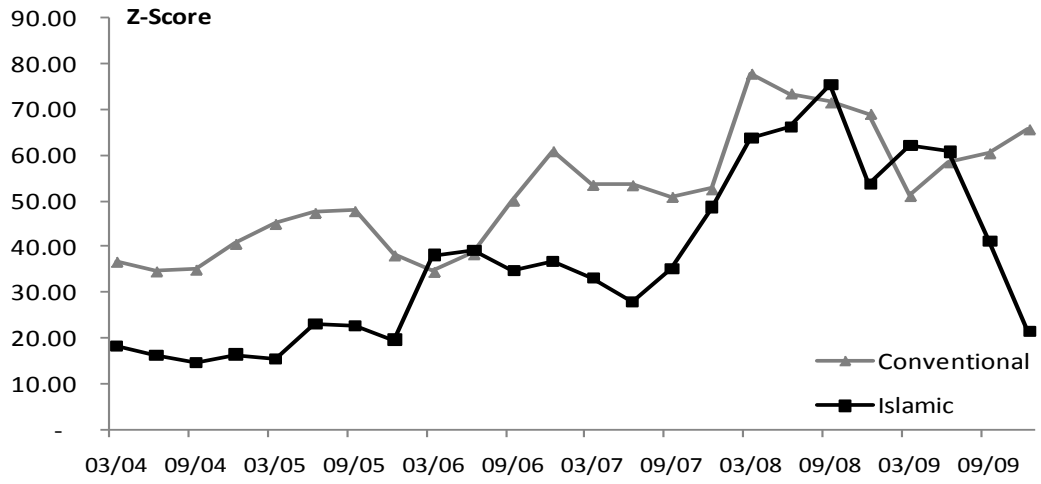


DATA OBSERVATION	12/04	12/05	12/06	12/07	12/08	12/09
TOTAL BANKS	79	80	78	79	78	76
ISLAMIC BANKS	8	10	10	10	12	10

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

In general, the results of Z-score measurement in the sample group of conventional banks and Islamic banks are presented on the trends graph of the average Z-score in Figure 6. It is showed that in general the stability of conventional banks and Islamic banks as shown by the Z-score indicators shows similar trends. At each time point in the observation period, the stability of Islamic banks is generally lower than that of conventional banks, except at some point, ie. the first and second quarters of 2006, the third quarter of 2008, and the first and second quarters of 2009. When compared with economic conditions and trends as shown by the Financial Stability Index measured by Bank Indonesia (see Appendix 4), the trend of the average value of Z-score is quite appropriate. In the period of a mini crisis in 2005 the Z-score shows a relatively low value, indicating that the level of bank stability decreases. In the subsequent period, the Z-score shows an increasing trend. This indicates a steady improvement of stability until a peak in the year 2008 when the global financial crisis emerged. The Z-scores tend to decrease. Figure 6 also shows that the average value of Z-score in the crisis period of 2008-2009 is still higher than that in the mini-crisis period of 2005. This indicates that banks in Indonesia have a better level of resilience facing the distress conditions.

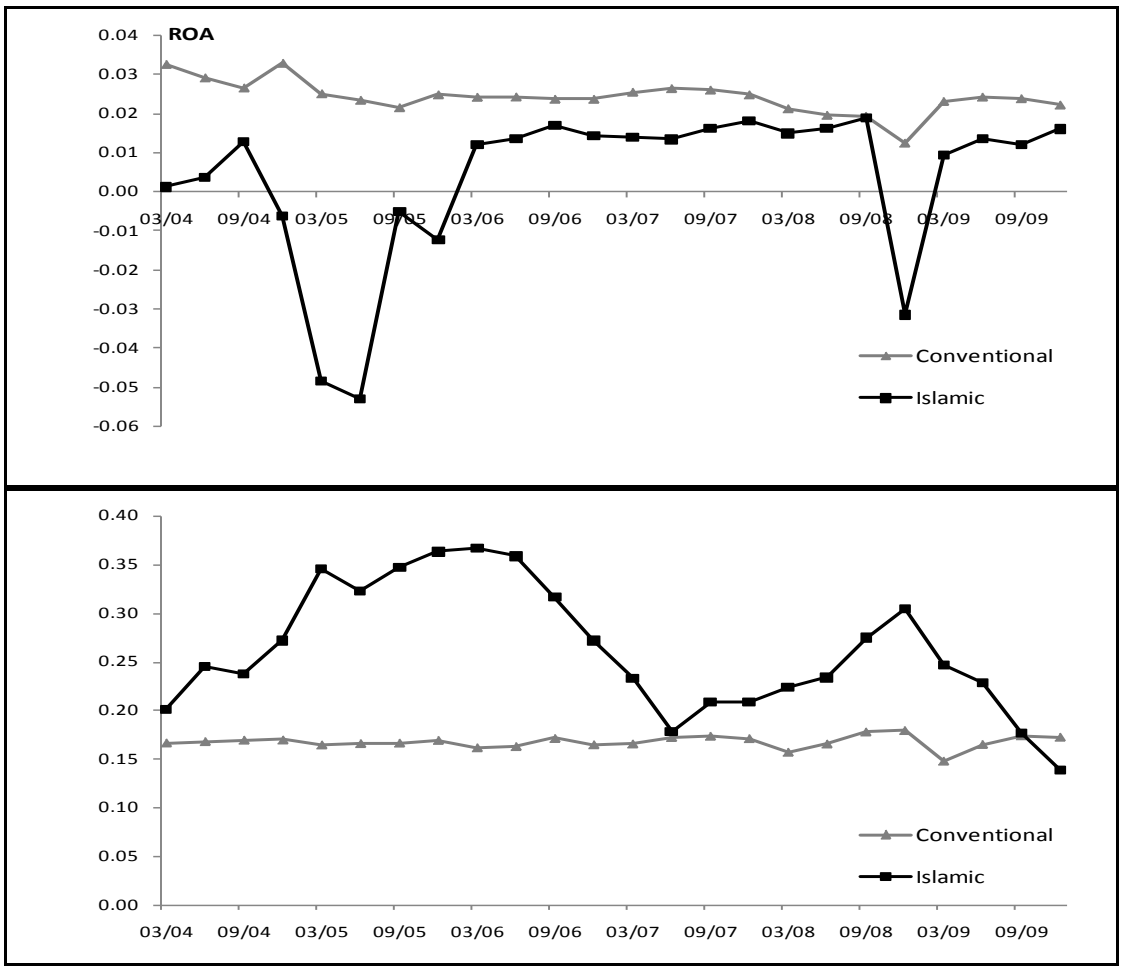
Figure 6
The Average Z-Score of the Conventional Banks and Islamic Banks, 2004 - 2009



Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

The average trend of rate of return (ROA) and the bank's equity (E/A) as the Z-score components is presented in the graph in Figure 7 below. The trend in the average return of Islamic banks shows a generally lower value than those of conventional banks, while the average equity ratio of Islamic banks is higher (except in the fourth quarter of 2009). This is consistent with the results from the descriptive statistics in Table 5.

Figure 7
The Average ROA and E/A of the Conventional Banks and Islamic Banks, 2004 - 2009



Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

In addition, the trend of the ROA of Islamic banks shows relatively higher volatility. Even in the fourth quarter of 2004 until the fourth quarter of 2005 and in the fourth quarter of 2008 Islamic banks show a negative value of ROA. In the period of 2004-2005, there were several newly established Islamic banks, such as UUS BTN, UUS Bank Niaga and UUS Bank Permata, whose income levels had not been able to accommodate the bank costs incurred. While in 2008, some Islamic banks experienced the organizational changes. For example UUS BRI and UUS Bukopin were spinned-off from their holding into BUS, and UUS Bank Niaga and UUS Bank Permata were established. In the process of changes, some problems that previously existed, such as non-performing loans, were solved with the imposition of loan losses. These things impacted on the achievement level of the return of Islamic banks as a whole.

Another thing shown in Figure 7 is that in facing the fluctuations of the level of return, Islamic banks seem to take a strategy to strengthen the capital equity as a financial buffer when the level of return is under pressure. On the contrary, at the time of relatively stable condition, Islamic banks loosen its equity level. Meanwhile, the average ROA trend of conventional banks tends to be stable, where the level of equity is also kept stable, except at the end of 2008, there is a slightly decrease.

As a development from the study of Čihák and Hesse (2008), we also conduct measurement to the level of stability within the Islamic banking industry, to compare between the stability of BUS and UUS. In general, BUS has a different capital structure compared to UUS. Based on the regulation of Bank Indonesia, the minimum share capital of BUS establishment is Rp 1 trillion. Meanwhile, UUS capital is not formed by an authorized paid-in capital but only the working capital that the holding conventional banks must set aside in the form of cash and maintain a minimum of Rp 100 billion so that the overall financial position and activities of UUS are consolidated in the holding. But in this study, a UUS is positioned as a commercial bank with a separate activity from its holding.

The Z-score measurement results of a sample only of BUS and UUS are presented in Table 5. It can be seen that in the sample of Islamic banks, the Z-score of BUS tends to be lower than the Z-score of UUS both in terms of mean and median, where higher variability of the data contained in the UUS sample with the minimum and maximum values is more extreme. This relatively lower Z-score of BUS is contributed mainly by the E/A of BUS which is smaller than that of UUS although the ROA of BUS tends to be larger and has better volatility compared to that of UUS. However, it should be noted that the level of UUS equity is larger because the measurement of E/A ratio includes the other liability account in the balance sheet of UUS as an equity component in addition to current profits.

Table 5
The Descriptive Statistic of the Z-Score Measurement (Islamic bank group sample)

ISLAMIC BANK SAMPLE	Z-SCORE		ROA		E/A		STDEV ROA	
	BUS	UUS	BUS	UUS	BUS	UUS	BUS	UUS
Mean	24.119	48.028	0.019	-0.005	0.110	0.354	0.012	0.028
Median	17.125	26.390	0.021	0.009	0.081	0.309	0.006	0.010
Maximum	133.650	317.430	0.056	0.074	0.895	0.883	0.103	0.204
Minimum	2.450	0.170	-0.099	-0.447	0.056	0.003	0.001	0.001
Std. Dev.	25.485	59.947	0.021	0.066	0.100	0.184	0.017	0.044
Skewness	2.645	2.449	-2.762	-4.214	6.380	0.877	3.619	2.333
Kurtosis	10.223	9.258	13.816	21.164	48.355	0.335	14.420	4.529
Jarque-Bera	267.1647	360.559						
Probability	0	0						
Sum	1929.49	6579.83						
Sum Sq. Dev.	51310.73	488733.1						
Observations	80	137	80	137	80	137	80	137

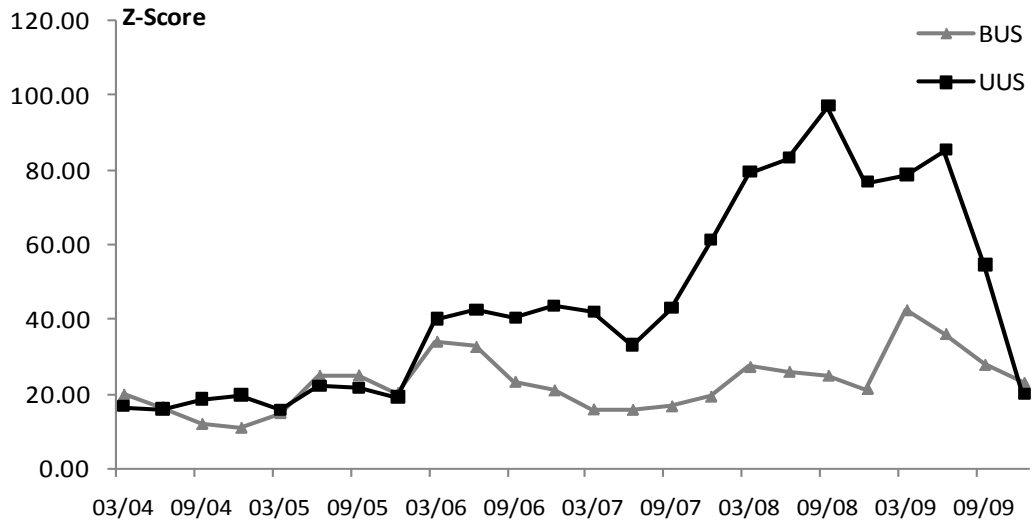
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

The mean of ROA is small and even negative for UUS. As noted previously, this is because in the observation period several Islamic banks have experienced the organizational dynamics such as the conversion type of business or the business activity is in the early stage of operations, where the bank costs is still not covered by the level of income earned. This has led to a pressure on the profitability of Islamic banks.

Figure 8 shows that in the period of 2004-2005, the average Z-score trend of BUS demonstrate values and movements that are relatively similar to those of UUS. But subsequently, the average Z-score of UUS continued to increase significantly until 2008 and then declined drastically in 2009. Although the average Z-score of BUS is generally lower in the whole period, but the variability shows a more stable trend. This is in accordance with the

relatively lower Z-score standard deviation of BUS compared with those of UUS as shown in Table 6.

Figure 8
The Average Z-Score of BUS and UUS, 2004 - 2009



Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

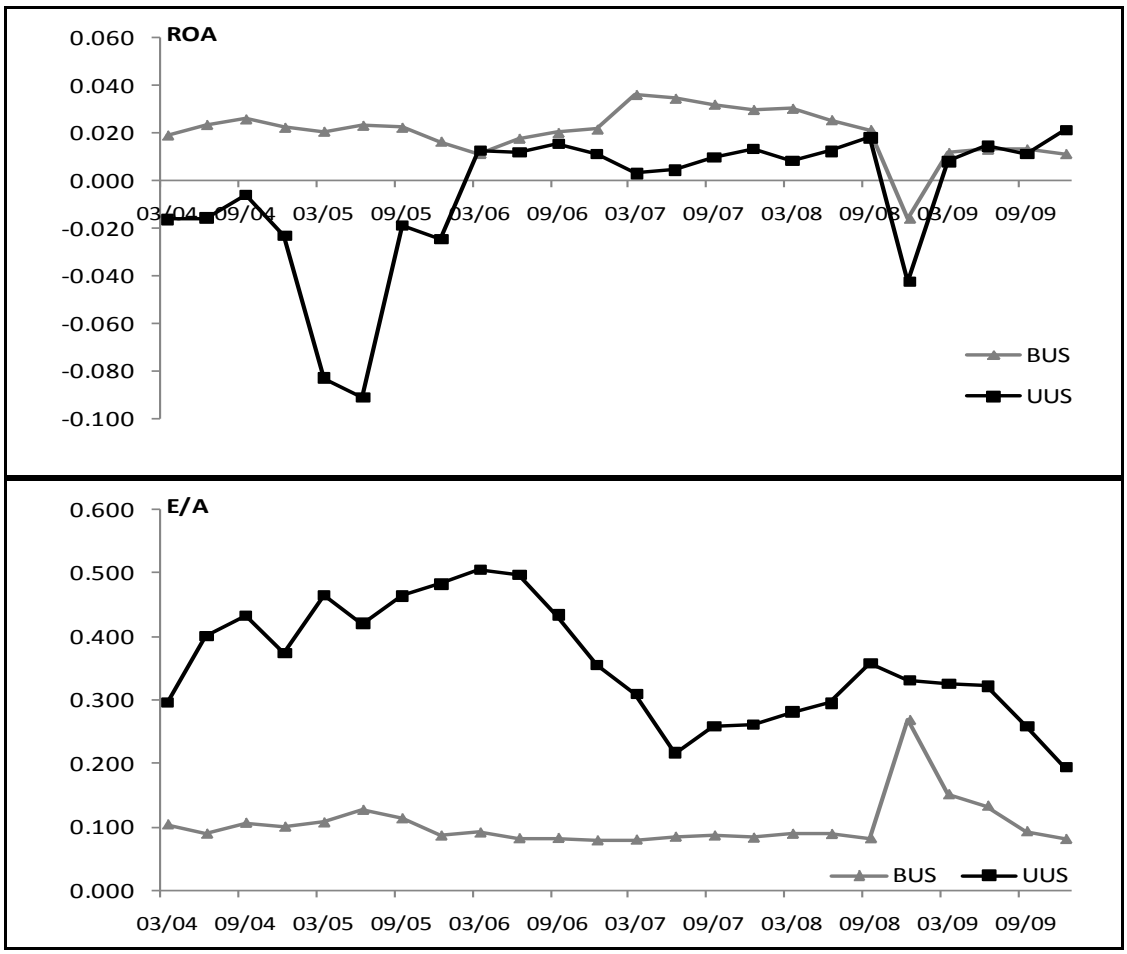
While the trend of the average of ROA and E/A ratio of Islamic banks is plotted in Figure 9. It can be seen that the trend of the ROA and E/A average ratio of UUS is more volatile than those of BUS. In general, the ROA of UUS tends to be lower but the E/A ratio is higher. This trend of ROA and E/A average ratio of Islamic banks confirms the results of the descriptive statistics and the previous explanations.

Furthermore, to determine whether the Z-score measurement results and their components have significant differences, the parametric statistical *t-tests* will be conducted with the consideration that the data are in the form of ratio and the number of samples (total of 1866 data) is large enough ($n_{syariah}$ and $n_{konvensional} > 30$). Although from Figure 4 it can be seen that the data are not normally distributed, but as the explanation from Dowdy et al., (2004) that based on the central limit theorem, the mean sampling distribution approaches a normal distribution as sample size n increases so that the normal distribution as the basic assumption of the parametric statistical tests can be used to approximate the probability of the non-normal distribution on a large number of samples ($n \geq 30$) as conducted in this study.

Related to this problem, in order to better fulfil the requirements of parametric statistical tests, the data can be transformed into other forms, such as in the forms of logarithm, square root and inverse, as long as the overall data are treated consistently. However, in this study the statistical tests remain to be done at the data level to determine the significance of the differences between groups of data in its basic form[5].

[5] One alternative data transformation is by using the function ln (1 + Z-score), as suggested by Demirgüç-Kunt and Detragiache (2009). The lognormal function is intended for smoothing the high Z-score and the value of 1 is added to avoid truncated at zero.

Figure 9
The Average ROA and E/A of BUS and UUS, 2004 - 2009



Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

The result summary of the *t-test* with two independent samples for the Z-score data is presented in Table 6 as follows.

Table 6
The Statistical *t-test* Result Summary, 2004-2009
(The average of all data based on the grouping)

Indicators	ALL BANKS			LARGE BANKS			SMALL BANKS		
	μConvn.	μSyariah	σ^2	μConvn.	μSyariah	σ^2	μConvn.	μSyariah	σ^2
Z-Score	51,878	39,213 *	=	57,341	33,288 *	≠	47,472	40,896	=
ROA	0,024	0,004 *	≠	0,028	0,021 *	≠	0,022	0,001 *	≠
E/A	0,168	0,264 *	≠	0,136	0,082 *	≠	0,194	0,316 *	≠
STDEV ROA	0,010	0,022 *	≠	0,008	0,005 *	≠	0,011	0,027 *	≠
Z-Score, 1-99 pctl #	46,819	36,995 *	=	48,954	33,288 *	≠	44,085	38,067	=
Z-Score, 2004-2005	40,790	18,840 *	≠						
Z-Score, 2006-2007	49,384	36,792 *	=						
Z-Score, 2008-2009	66,206	55,668 *	=						

Notes:

* Significant at α = 5%

σ^2 Variance between groups is the same (=) or not the same (≠)

\# As an effort to reduce the influence of any outliers, the sample data which is under the 1st percentile and above the 99th percentile are removed from the observation, such as conducted by Čihák and Hesse (2008).

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

In the data sample of all banks, the Z-score mean of Islamic banks and conventional banks show a significant difference with the level of data variability in both samples tending to be similar. This result also applies to the group of large banks, but the level of variability tends to be different. While in the group of small banks, it turns out that the difference of the mean of Z-score between small Islamic banks and conventional banks is not significant with relatively similar level of variability. This indicates that the small Islamic banks and the small conventional banks in Indonesia have a relatively same level of stability in the period of 2004-2009.

On the examination of the Z-score components, there are significant mean differences in all groups of observation with different level of data variability. Meanwhile, to see the trend of differences in the level of stability within the period of observation, the *t-test* is also conducted by dividing the observation period into three periods of observation: the period of 2004-2005 (the period around the mini-crisis 2005), 2006-2007 (recovery period) and 2008-2009 (the period around the global financial crisis of 2008). The result shows that in the periods of 2004-2005 and 2006-2007, the Z-score of Islamic banks and conventional banks on average are significantly different, whereas in the period of 2004-2005 the level of variability is different, but in the period of 2006-2007 the level of variability is the same. A different result is obtained for the observation period of 2008-2009, in which the difference in the Z-score of Islamic banks and conventional banks is not significant. These shows that particularly throughout the distress conditions caused by the global financial crisis, both Islamic banks and conventional banks in Indonesia have a relatively same level of resistance.

Furthermore, the result summary of the statistical test for the observation data on the Islamic banking industry is presented in Table 7 below.

Table 7
The Statistical *t-test* Result Summary, 2004-2009
(The average of Islamic banks data sample based on the group type)

Islamic Bank Indicators	FULL-FLEDGED	BUSINESS UNIT	
	μBUS	μUUS	σ^2
Z-Score	24,119	48,028 *	≠
ROA	0,019	-0,005 *	≠
E/A	0,110	0,354 *	≠
STDEV ROA	0,012	0,028 *	≠

Notes:
* Significant at α = 5%
σ^2 Variance between groups is the same (=) or not the same (≠)

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation

The Z-score mean of BUS and UUS is significantly different with the level of data variability in both samples tending to be the same. This confirms the descriptive statistics in Table 6 and the trend of Z-score average of Islamic banks in Figure 8 above. On the examination of the Z-score components, there is a significant difference in the value of all components with different levels of data variability. Although the ROA of BUS in terms of mean is higher than the ROA of UUS and the volatility tends to be lower, the mean E/A ratio of BUS shows a lower value than that of UUS, thus resulting in lower Z-score of BUS. However, it should be noted that the equity ratio of UUS is higher because in this study its measurement includes the other liability account in the balance sheet of UUS as an equity component in addition to current profits.

Summarizing, Islamic banks in Indonesia have generally lower level of stability compared with the conventional banks in the period of 2004-2009. This difference in the level of stability is significant for the data sample of all banks and large banks. In the group of small banks, the difference is not significant, indicating that small Islamic banks and conventional banks in Indonesia have a relatively same level of stability. Particularly in the crisis period of 2008-2009, the stability of Islamic banks is also relatively lower but the difference is not significant. Therefore, both Islamic banks and conventional banks in Indonesia have relatively the same level of resilience throughout that condition of financial distress.

The relatively lower stability of Islamic banks is mainly contributed by the lower return of Islamic banks than that of conventional banks, although the equity level is higher (except for large Islamic banks). This is because most of the Islamic banks in the observation period experience the dynamics of organizational change that requires to resolve some carrying problems such as loss of productive assets, or as an infant industry (Turk-Ariss, 2010a), the level of bank earnings in the early operations has not been able to accommodate the costs incurred. These conditions impact on the achievement level of the return of Islamic banks as a whole.

In the measurement of the Islamic banking industry, we find that UUS have the level of stability better than BUS. This is contributed mainly by the relatively higher equity of UUS although the return is low. However, it should be noted that the equity measurement of UUS includes the operating funds from the holding conventional banks as a component of the equity besides the current profits. This indicates that the stability level of UUS still depends on the financial support from the holding conventional banks. There is also a possibility that the Z-score measurement of UUS may biased since UUS are considered to have the problem of "fungibility" results in the difficulties to examine UUS independently from the holding (Karwowski, 2009).

From the measurement applied to the data of individual bank, we also obtained the positioning of each Islamic bank in the banking industry in Indonesia based on the level of stability. The results show that in the entire observation period, the position of the majority of Islamic banks is generally still below the industry average (based on median). This confirms the main finding that the stability of Islamic banks tends to be lower than conventional banks.

7. Conclusions

In this paper, we use the Z-score measurement as the indicator of individual bank stability. In the literature of Islamic banking, this indicator is used empirically by Čihák and Hesse (2008) and discussed theoretically by Mirakhor (1987). While there are many emerging cross-country studies on Islamic bank stability, the empirical analysis in this paper is based on the country-level data of the banking industry in Indonesia. We hope it can be used as a comparison to the existing cross-country studies on the topic so that providing additional insights to the emerging literature of Islamic banking.

The main result of this paper shows that in general, Islamic banks in Indonesia tend to have significantly lower level of stability compared to the conventional banks and this tendency is applied consistently to all groups of banks. This result is different from the cross-country study of Čihák and Hesse (2008), which concludes that the level of stability among groups of banks has different tendency of comparison. Our finding can be understood; given the Islamic banking in Indonesia is still an infant industry with a relatively low return due to some financial pressure from the internal side. An exemption includes the insignificant difference of the stability between small Islamic banks and small conventional banks, indicating a relatively same level of resilience of these groups.

The result also differs with another cross-country study by Boumediene and Caby (2009) which shows that Islamic banks indicate a better resilience compared with conventional banks throughout the global financial crisis. Furthermore, although in the post-crisis period of 2009 the level of stability is decreasing, in general it is still better than in the mini-crisis period of 2005. This shows that banks in Indonesia have a better level of stability facing the financial distress conditions.

This study also compares the stability of full-fledged Islamic banks (BUS) and Islamic business unit of conventional banks (UUS). The results show that UUS have significantly higher level of stability compared with BUS but an important note is taken into account regarding the equity calculation of UUS that indicates a financial dependency from the holding conventional banks. Although there is a possibility that the Z-score measurement of UUS may significantly biased, if we rank all samples of banks based on the level of stability, the result still confirms that Islamic banks are evidenced with the lower stability than that of conventional banks.

Other issues are considered as the limitations of this study that need to be explored for further studies in the topic of Islamic bank stability. *First*, Z-scores measured in this paper are used only for comparison but the cut-off value of a considered "good" value of Z-score still has not been determined explicitly, as well as any probability of the outliers exist. *Second*, the development of Islamic banking is in the high growth but the financial data of Islamic banks, particularly the data of UUS is still quite inadequate. For further study, the availability of observation data of Islamic banks is expected to be more complete and thorough. *Third*, this paper does not examine the factors that could affect the stability of Islamic banks. Therefore, studies on this topic can be developed by referring to the suggestion from the previous studies, such as related to the influence of the bank competition (Turk-Ariss, 2010a) and the influence of the profit-loss sharing-based financing (Čihák and Hesse, 2008).

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Appendix 1

The Availability of the Observation Data, 2004-2009

OBSERVATION		2004				2005				2006				2007				2008				2009			
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
ISLAMIC BANKS																									
BUS	BSM																								
	MUAMALAT																								
	MEGA																								
	BRIS BUS																								
	BSB BUS																								
UUS	BNIS																								
	BRIS UUS																								
	BSB UUS																								
	BDIS																								
	BTNS																								
	NIAGAS																								
	PERMATAS																								
STATE OWNED BANKS																									
	BNI																								
	BRI																								
	BTN																								
	MANDIRI																								
FOREIGN EXCHANGE COMMERCIAL BANKS																									
	AGRONIAGA																								
	ARTHA GRAHA INTL																								
	ARTHA GRAHA																								
	BCA																								
	BII																								
	BNP																								
	BUKOPIN																								
	BUMI ARTA																								
	CAPITAL																								
	CIMB NIAGA																								
	DANAMON																								
	EKONOMI																								
	GANESHA																								
	HAGAKITA																								
	HAGA																								
	HANA																								
	ICB BUMIPUTERA																								
	ICBC INDONESIA																								
	KESAWAN																								
	LIPPO																								
	MASPION																								
	MAYAPADA																								
	MEGA																								
	MESTIKA																								
	MUTIARA																								
	OCBC NISP																								
	PANIN																								
	PERMATA																								
	SAUDARA																								
	SBI INDONESIA																								
	SINARMAS																								
	SWADESI																								
	UOB BUANA																								
	WINDU																								
NON-FOREIGN EXCHANGE COMMERCIAL BANKS																									
	BTPN																								
	EKSEKUTIF																								
	HARDA																								
	INDEX SELINDO																								
	JASA JAKARTA																								
	KESEJAHTERAAN																								
	VICTORIA																								
	YUDHA BAKTI																								
JOINT VENTURE BANKS																									
	ANZ																								
	BNP PARIBAS																								
	CHINA TRUST																								
	COMMONWEALTH																								
	DBS																								
	KEB INDONESIA																								
	MAYBANK																								
	MIZUHO																								
	OCBC INDONESIA																								
	RABOBANK																								
	RESONA																								
	SUMITOMO																								
	UOB INDONESIA																								
	WINDU INTL																								
	WOORI																								
FOREIGN OWNED BANKS																									
	ABN AMRO																								
	BANGKOK BANK																								
	BANK OF AMERICA																								
	BANK OF CHINA LTD																								
	CITIBANK																								
	DEUTSCHE BANK																								
	HSBC																								
	JP MORGAN																								
	STAN-CHART																								
	TOKYO MITSUBISHI																								

Appendix 2

The Availability of Data Sample Based on Total Assets

Period	Total Sample Asset per period (Rp trillion)		Total Banking Asset per period (Rp trillion)		Data Availability based on Total Banking Asset	
	Islamic	Conventional	Islamic	Conventional	Islamic	Conventional
Mar 2004	8.94	996.51	9.50	1,141.98	94.16%	87.26%
Jun 2004	10.50	1,031.09	11.02	1,176.33	95.22%	87.65%
Sep 2004	12.04	1,051.47	12.72	1,202.35	94.64%	87.45%
Dec 2004	14.64	1,098.75	15.04	1,259.57	97.38%	87.23%
Mar 2005	15.18	1,105.77	16.36	1,267.33	92.81%	87.25%
Jun 2005	16.16	1,152.72	17.74	1,330.64	91.10%	86.63%
Sep 2005	17.22	1,221.17	18.45	1,404.05	93.31%	86.97%
Dec 2005	20.08	1,261.03	20.88	1,452.72	96.17%	86.81%
Mar 2006	19.57	1,245.11	20.55	1,448.87	95.24%	85.94%
Jun 2006	21.08	1,275.88	22.70	1,501.19	92.88%	84.99%
Sep 2006	22.95	1,264.54	24.31	1,558.82	94.40%	81.12%
Dec 2006	25.27	1,414.30	26.72	1,672.70	94.58%	84.55%
Mar 2007	26.79	1,421.53	28.45	1,682.05	94.19%	84.51%
Jun 2007	27.48	1,480.27	29.21	1,748.07	94.06%	84.68%
Sep 2007	29.77	1,541.50	31.80	1,825.79	93.61%	84.43%
Dec 2007	33.73	1,677.34	36.54	1,959.22	92.31%	85.61%
Mar 2008	35.31	1,640.34	38.34	1,916.16	92.08%	85.61%
Jun 2008	39.45	1,719.91	42.98	2,009.60	91.79%	85.58%
Sep 2008	42.07	1,780.55	45.86	2,094.05	91.74%	85.03%
Dec 2008	44.90	1,916.38	49.56	2,276.52	90.61%	84.18%
Mar 2009	46.99	1,953.02	51.68	2,315.45	90.93%	84.35%
Jun 2009	50.26	1,997.65	55.24	2,313.60	90.99%	86.34%
Sep 2009	52.71	2,036.18	58.03	2,345.98	90.82%	86.79%
Dec 2009	59.19	2,184.28	66.09	2,486.09	89.56%	87.86%
Data Availability Average					**93.11%**	**85.78%**

Appendix 3

The Bank Ranking Based on the Level of Stability

No.	BANK	Dec 2004
1	CITIBANK	326.55
2	MESTIKA	277.86
3	ICBC INDONESIA	206.00
4	BANGKOK BANK	190.51
5	SWADESI	123.24
6	HAGAKITA	94.13
7	HANA	77.49
8	BTPN	74.05
9	SINARMAS	73.97
10	AGRONIAGA	65.50
11	ICB BUMIPUTERA	50.18
12	ANZ	50.03
13	BUKOPIN	49.96
14	BNP	48.45
15	BUMI ARTA	48.04
16	UOB BUANA	46.37
17	KESEJAHTERAAN	45.72
18	INDEX SELINDO	45.40
19	BRIS UUS	42.98
20	OCBC NISP	42.41
21	MIZUHO	42.24
22	CHINA TRUST	40.86
23	BCA	39.89
24	TOKYO MITSUBISHI	37.36
25	WOORI	37.09
26	EKONOMI	36.91
27	UOB INDONESIA	34.72
28	PANIN	33.65
29	OCBC INDONESIA	32.12
30	JASA JAKARTA	31.18
31	MANDIRI	28.60
32	RESONA	28.29
33	HSBC	26.96
34	BANK OF CHINA LTD	26.66
35	BNIS	24.98
36	SUMITOMO	24.44
37	KEB INDONESIA	24.37
38	MASPION	23.96
39	VICTORIA	22.43
40	BRI	22.10
41	BSB UUS	19.96
42	MAYAPADA	19.77
43	STAN-CHART	18.62
44	GANESHA	17.77
45	MAYBANK	17.43
46	HAGA	16.80
47	BII	16.41
48	YUDHA BAKTI	16.04
49	MEGA	15.72
50	CIMB NIAGA	15.54
51	BNI	14.54
52	EKSEKUTIF	14.15
53	ARTHA GRAHA	14.09
54	SBI INDONESIA	13.74
55	COMMONWEALTH	13.44
56	BANK OF AMERICA	13.38
57	DBS	12.89
58	MUAMALAT	12.87
59	WINDU INTL	11.99
60	BNP PARIBAS	11.57
61	HARDA	11.19
62	MEGAS	11.19
63	BTN	10.06
64	NIAGAS	9.93
65	BSM	9.07
66	RABOBANK	8.49
67	SAUDARA	7.87
68	KESAWAN	7.50
69	ARTHA GRAHA INTL	7.45
70	DANAMON	7.23
71	LIPPO	5.76
72	DEUTSCHE BANK	5.53
73	ABN AMRO	5.06
74	JP MORGAN	4.73
75	CAPITAL	3.83
76	PERMATA	3.69
77	MUTIARA	2.76
78	WINDU	0.84
79	PERMATAS	0.56
80	BRIS BUS	
81	BSB BUS	
82	BDIS	
83	BTNS	
	MEAN	38.32
	MEDIAN	22.10

TOTAL OBSERVATION	79
ISLAMIC BANKS OBS.	8
BANK WITH Z > MEDIAN	2
% Z ISLAMIC > MEDIAN	25.00%
ISLAMIC : TOP 10	0
ISLAMIC : BOTTOM 10	1

No.	BANK	Dec 2005
1	BCA	150.78
2	MESTIKA	143.63
3	BANK OF CHINA LTD	134.62
4	CITIBANK	118.22
5	BANGKOK BANK	111.67
6	TOKYO MITSUBISHI	99.50
7	MAYAPADA	90.82
8	WOORI	85.00
9	ICBC INDONESIA	82.77
10	HAGAKITA	72.27
11	INDEX SELINDO	69.52
12	OCBC INDONESIA	68.42
13	BSB UUS	63.24
14	SWADESI	63.03
15	EKONOMI	62.48
16	HANA	57.31
17	MIZUHO	55.11
18	ANZ	54.06
19	AGRONIAGA	48.13
20	BUKOPIN	45.20
21	SBI INDONESIA	45.03
22	HAGA	42.81
23	BII	42.32
24	SINARMAS	38.64
25	HSBC	38.26
26	KESEJAHTERAAN	36.28
27	BUMI ARTA	35.27
28	UOB BUANA	33.89
29	MASPION	33.75
30	CIMB NIAGA	33.57
31	BTN	31.01
32	MUAMALAT	30.57
33	KEB INDONESIA	30.04
34	BNIS	29.92
35	UOB INDONESIA	27.86
36	KESAWAN	27.05
37	BNI	26.59
38	CHINA TRUST	26.22
39	BRI	24.66
40	RABOBANK	24.46
41	DANAMON	24.07
42	BANK OF AMERICA	23.64
43	BNP	22.87
44	SUMITOMO	22.77
45	BRIS UUS	22.46
46	RESONA	22.32
47	YUDHA BAKTI	22.21
48	VICTORIA	21.99
49	JASA JAKARTA	21.46
50	GANESHA	21.27
51	MAYBANK	20.97
52	BSM	19.70
53	LIPPO	19.11
54	ICB BUMIPUTERA	18.42
55	WINDU INTL	18.39
56	SAUDARA	17.80
57	OCBC NISP	17.79
58	PANIN	16.59
59	HARDA	15.87
60	PERMATA	15.61
61	BTPN	13.39
62	MEGAS	10.93
63	DBS	10.63
64	MEGA	10.41
65	WINDU	10.34
66	MANDIRI	10.32
67	BNP PARIBAS	9.68
68	ABN AMRO	8.92
69	COMMONWEALTH	8.90
70	STAN-CHART	6.52
71	BDIS	5.54
72	PERMATAS	5.32
73	CAPITAL	4.83
74	DEUTSCHE BANK	4.52
75	BTNS	4.46
76	NIAGAS	3.92
77	EKSEKUTIF	2.08
78	JP MORGAN	1.91
79	MUTIARA	1.56
80	ARTHA GRAHA INTL	1.19
81	BRIS BUS	
82	BSB BUS	
83	ARTHA GRAHA	
	MEAN	35.93
	MEDIAN	24.26

TOTAL OBSERVATION	80
ISLAMIC BANKS OBS.	10
BANK WITH Z > MEDIAN	3
% Z ISLAMIC > MEDIAN	30.00%
ISLAMIC : TOP 10	0
ISLAMIC : BOTTOM 10	4

No.	BANK	Dec 2006
1	CITIBANK	326.84
2	OCBC NISP	322.69
3	ICB BUMIPUTERA	255.45
4	PERMATA	237.25
5	PANIN	202.53
6	BUMI ARTA	143.88
7	BNIS	125.53
8	BUKOPIN	115.75
9	MASPION	104.34
10	BANK OF CHINA LTD	98.98
11	UOB INDONESIA	97.14
12	WOORI	96.35
13	BII	95.06
14	BCA	89.23
15	CIMB NIAGA	84.99
16	MESTIKA	84.19
17	BRIS UUS	82.10
18	ICBC INDONESIA	76.69
19	EKONOMI	72.67
20	SWADESI	69.67
21	UOB BUANA	63.74
22	VICTORIA	63.41
23	SUMITOMO	60.29
24	KEB INDONESIA	59.14
25	ARTHA GRAHA INTL	57.38
26	TOKYO MITSUBISHI	57.29
27	OCBC INDONESIA	54.64
28	MIZUHO	53.89
29	ANZ	52.72
30	MUTIARA	50.08
31	BTNS	48.61
32	STAN-CHART	48.45
33	INDEX SELINDO	46.90
34	SBI INDONESIA	44.09
35	MAYBANK	40.51
36	MANDIRI	38.62
37	KESEJAHTERAAN	38.27
38	SINARMAS	37.39
39	LIPPO	37.02
40	BANGKOK BANK	36.97
41	MUAMALAT	36.33
42	KESAWAN	36.10
43	RESONA	34.83
44	ABN AMRO	31.24
45	MEGA	31.04
46	BNP	31.01
47	DBS	29.88
48	BRI	27.31
49	MAYAPADA	27.23
50	BTPN	26.23
51	HAGAKITA	26.20
52	JASA JAKARTA	25.86
53	BTN	25.36
54	BNI	25.16
55	WINDU INTL	24.95
56	CHINA TRUST	24.39
57	BSB UUS	24.00
58	SAUDARA	22.18
59	HANA	22.12
60	BSM	21.77
61	HSBC	19.70
62	BNP PARIBAS	19.10
63	COMMONWEALTH	18.99
64	HAGA	18.70
65	DANAMON	15.49
66	AGRONIAGA	12.70
67	NIAGAS	12.16
68	GANESHA	12.15
69	YUDHA BAKTI	10.36
70	BANK OF AMERICA	9.70
71	HARDA	8.00
72	PERMATAS	7.99
73	WINDU	6.67
74	CAPITAL	5.42
75	MEGAS	5.21
76	BDIS	4.99
77	EKSEKUTIF	4.97
78	RABOBANK	3.67
79	BRIS BUS	
80	BSB BUS	
81	ARTHA GRAHA	
82	DEUTSCHE BANK	
83	JP MORGAN	
	MEAN	57.95
	MEDIAN	37.00

TOTAL OBSERVATION	78
ISLAMIC BANKS OBS.	10
BANK WITH Z > MEDIAN	3
% Z ISLAMIC > MEDIAN	30.00%
ISLAMIC : TOP 10	1
ISLAMIC : BOTTOM 10	3

Note:
The highlighted are the Islamic Banks.

Appendix 3 (Con't)

No.	BANK	Dec 2007
1	CITIBANK	253.10
2	MASPION	187.11
3	BTNS	173.03
4	UOB BUANA	158.64
5	JASA JAKARTA	130.45
6	ARTHA GRAHA INTL	128.21
7	MAYAPADA	127.05
8	MESTIKA	115.01
9	WINDU INTL	111.25
10	BRI	106.66
11	BNIS	104.99
12	UOB INDONESIA	98.33
13	BANGKOK BANK	97.79
14	BUKOPIN	91.31
15	JP MORGAN	88.20
16	KEB INDONESIA	79.32
17	OCBC NISP	78.46
18	BCA	76.19
19	PANIN	74.82
20	WOORI	74.39
21	EKONOMI	72.36
22	TOKYO MITSUBISHI	71.68
23	BII	65.33
24	BUMI ARTA	64.08
25	CIMB NIAGA	61.00
26	SWADESI	60.39
27	BRIS UUS	51.67
28	OCBC INDONESIA	47.86
29	MUTIARA	47.07
30	GANESHA	45.94
31	KESEJAHTERAAN	42.00
32	BTN	40.85
33	BNP	40.25
34	PERMATA	39.84
35	HAGAKITA	38.16
36	INDEX SELINDO	37.96
37	CAPITAL	36.95
38	ANZ	35.88
39	BTPN	34.14
40	SBI INDONESIA	33.28
41	NIAGAS	32.27
42	BNP PARIBAS	32.08
43	DANAMON	31.83
44	BSB UUS	31.14
45	CHINA TRUST	29.03
46	HANA	28.90
47	MIZUHO	27.32
48	HSBC	26.47
49	LIPPO	25.89
50	KESAWAN	25.16
51	BNI	25.10
52	SUMITOMO	24.46
53	ICB BUMIPUTERA	23.29
54	SAUDARA	22.35
55	ICBC INDONESIA	21.81
56	YUDHA BAKTI	21.79
57	ABN AMRO	21.66
58	MANDIRI	21.32
59	BSM	21.02
60	SINARMAS	20.45
61	DBS	20.41
62	MUAMALAT	20.28
63	AGRONIAGA	19.61
64	VICTORIA	19.39
65	RESONA	19.22
66	COMMONWEALTH	19.14
67	MAYBANK	19.12
68	PERMATAS	17.77
69	BDIS	17.52
70	MEGAS	16.92
71	DEUTSCHE BANK	15.45
72	MEGA	14.97
73	BANK OF CHINA LTD	13.81
74	HAGA	13.57
75	STAN-CHART	13.20
76	RABOBANK	12.31
77	BANK OF AMERICA	8.58
78	EKSEKUTIF	6.71
79	HARDA	2.26
80	BRIS BUS	
81	BSB BUS	
82	ARTHA GRAHA	
83	WINDU	
	MEAN	52.21
	MEDIAN	33.28

TOTAL OBSERVATION	79
ISLAMIC BANKS OBS.	10
BANK WITH Z > MEDIAN	3
% Z ISLAMIC > MEDIAN	30.00%
ISLAMIC : TOP 10	1
ISLAMIC : BOTTOM 10	1

No.	BANK	Dec 2008
1	CITIBANK	1,230.22
2	BTNS	317.43
3	BTN	252.01
4	BANGKOK BANK	196.12
5	WOORI	132.19
6	GANESHA	119.92
7	BUKOPIN	97.72
8	BCA	90.05
9	EKONOMI	85.63
10	TOKYO MITSUBISHI	76.49
11	OCBC NISP	73.50
12	BRI	73.22
13	ARTHA GRAHA INTL	72.87
14	JASA JAKARTA	72.47
15	BUMI ARTA	72.14
16	KEB INDONESIA	69.20
17	MANDIRI	68.17
18	BNIS	66.13
19	SBI INDONESIA	65.64
20	SINARMAS	64.62
21	CAPITAL	63.95
22	MESTIKA	61.61
23	BSB UUS	59.67
24	MEGA	58.11
25	VICTORIA	58.09
26	INDEX SELINDO	56.09
27	KESAWAN	53.96
28	NIAGAS	51.95
29	MAYAPADA	51.88
30	CHINA TRUST	50.51
31	ICBC INDONESIA	46.90
32	UOB INDONESIA	46.43
33	MIZUHO	45.53
34	SUMITOMO	45.19
35	SWADESI	43.83
36	PANIN	42.16
37	BNI	41.72
38	BSM	40.76
39	ICB BUMIPUTERA	40.16
40	AGRONIAGA	39.89
41	YUDHA BAKTI	39.75
42	BTPN	38.47
43	KESEJAHTERAAN	38.39
44	OCBC INDONESIA	37.91
45	DBS	37.67
46	BNP	36.89
47	HSBC	36.81
48	BANK OF CHINA LTD	36.75
49	BANK OF AMERICA	36.59
50	MASPION	34.97
51	WINDU INTL	33.39
52	MUAMALAT	32.90
53	UOB BUANA	31.78
54	MAYBANK	31.61
55	ANZ	31.20
56	HARDA	30.32
57	SAUDARA	30.15
58	PERMATA	29.70
59	BDIS	29.61
60	BII	26.73
61	JP MORGAN	26.50
62	DANAMON	21.41
63	BRIS BUS	18.69
64	HANA	18.57
65	COMMONWEALTH	18.27
66	CIMB NIAGA	17.13
67	STAN-CHART	16.11
68	RESONA	16.10
69	ABN AMRO	12.60
70	BNP PARIBAS	11.79
71	DEUTSCHE BANK	11.56
72	RABOBANK	11.44
73	PERMATAS	11.21
74	EKSEKUTIF	9.84
75	BSB BUS	8.45
76	MEGAS	6.56
77	BRIS UUS	1.83
78	MUTIARA	(0.68)
79	ARTHA GRAHA	
80	HAGAKITA	
81	HAGA	
82	LIPPO	
83	WINDU	
	MEAN	66.83
	MEDIAN	40.02

TOTAL OBSERVATION	78
ISLAMIC BANKS OBS.	12
BANK WITH Z > MEDIAN	5
% Z ISLAMIC > MEDIAN	41.67%
ISLAMIC : TOP 10	1
ISLAMIC : BOTTOM 10	4

No.	BANK	Dec 2009
1	CITIBANK	472.40
2	BCA	416.46
3	MASPION	331.30
4	UOB INDONESIA	189.77
5	KESAWAN	174.51
6	MIZUHO	127.60
7	BUKOPIN	115.96
8	DANAMON	113.00
9	BUMI ARTA	110.84
10	PERMATA	105.44
11	BANGKOK BANK	97.04
12	BSM	92.02
13	MESTIKA	90.22
14	ARTHA GRAHA INTL	85.33
15	TOKYO MITSUBISHI	81.19
16	MAYAPADA	78.65
17	SBI INDONESIA	75.39
18	MANDIRI	75.16
19	WOORI	72.38
20	MAYBANK	69.65
21	BTN	65.42
22	MEGA	62.82
23	KEB INDONESIA	61.36
24	PANIN	61.08
25	EKONOMI	59.80
26	BANK OF AMERICA	54.44
27	CAPITAL	53.05
28	UOB BUANA	51.89
29	OCBC NISP	51.38
30	BANK OF CHINA LTD	51.03
31	SWADESI	50.12
32	BTNS	49.12
33	JASA JAKARTA	47.87
34	DBS	47.25
35	BRI	44.57
36	ICBC INDONESIA	44.19
37	SUMITOMO	42.98
38	WINDU INTL	39.35
39	INDEX SELINDO	38.19
40	SINARMAS	33.87
41	BNI	32.01
42	CHINA TRUST	31.83
43	HANA	29.80
44	VICTORIA	28.64
45	OCBC INDONESIA	25.68
46	HARDA	24.03
47	GANESHA	22.88
48	BDIS	21.80
49	ICB BUMIPUTERA	21.22
50	YUDHA BAKTI	20.80
51	RABOBANK	19.92
52	BNP PARIBAS	19.88
53	KESEJAHTERAAN	19.56
54	HSBC	19.53
55	BNP	18.93
56	COMMONWEALTH	18.68
57	STAN-CHART	16.76
58	ABN AMRO	16.37
59	BII	16.10
60	SAUDARA	15.92
61	RESONA	15.66
62	PERMATAS	14.41
63	AGRONIAGA	14.06
64	DEUTSCHE BANK	14.06
65	BTPN	12.87
66	MEGAS	12.08
67	NIAGAS	11.44
68	CIMB NIAGA	9.55
69	JP MORGAN	8.13
70	ANZ	7.35
71	MUAMALAT	6.46
72	BNIS	3.54
73	BSB BUS	2.50
74	BRIS BUS	2.45
75	EKSEKUTIF	2.02
76	MUTIARA	(0.04)
77	BRIS UUS	
78	BSB UUS	
79	ARTHA GRAHA	
80	HAGAKITA	
81	HAGA	
82	LIPPO	
83	WINDU	
	MEAN	60.01
	MEDIAN	38.77

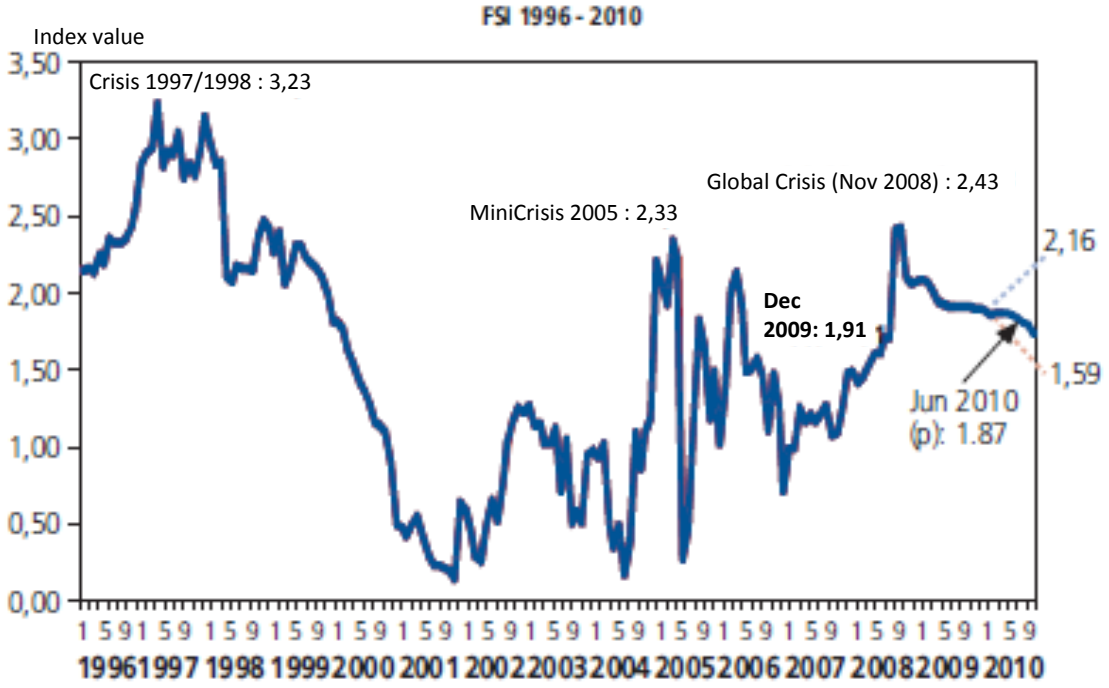
TOTAL OBSERVATION	76
ISLAMIC BANKS OBS.	10
BANK WITH Z > MEDIAN	2
% Z ISLAMIC > MEDIAN	20.00%
ISLAMIC : TOP 10	0
ISLAMIC : BOTTOM 10	5

Note:
The highlighted are the Islamic Banks.

Appendix 4
The Financial Stability Index (FSI)

In Indonesia, one of the indicators used by Bank Indonesia in assessing the resilience of the financial sector is called the Financial Stability Index (Bank Indonesia, 2010). The Financial Stability Index (FSI) is one example of a hybrid model that combines the measurement of the accounting data and the market data. The measurement of stability using FSI is more complex than the measurement of the Z-score and also more forward-looking oriented.

Figure A
The Financial Stability Index of BUS and UUS, 1996 - 2010



Source: Bank Indonesia (2010)