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The stability comparison between Islamic banks and conventional banks: Evidence in Indonesia

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Abstract - This study aims to determine the stability of Islamic banking as compared with conventional banking in Indonesia. In this case, the level of bank stability is measured individually using an accounting-based bank soundness measurement called the Z-score indicator. Using the parametric statistical t-test, the study shows that the level of stability in Islamic banks versus conventional banks is 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 exclusions include the tendency for small Islamic banks to have relatively the same degree of stability as 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).

Keywords: 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), which were 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 was recorded at 14.8% per

year, where growth in 2009 only reached 9.7%, which is the lowest growth rate over the last five years.

Along with this strong growth, a broad view of Islamic banking resilience has arisen. Islamic banking is considered as an alternative to 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 a level over 100%, while conventional banks' loan to deposit ratio (LDR) dropped below 50%.

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

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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.

system, i.e., 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 was considered low (Bank Indonesia, 2009b).

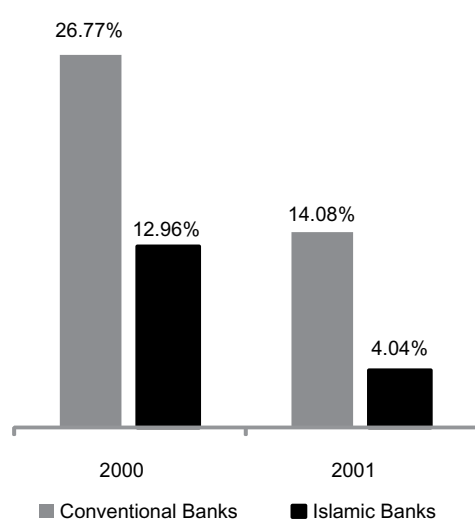
Despite its severe impact, the global financial crisis has triggered increasing attention, bringing into question the resilience of Islamic banks and their relationship with financial stability. Hasan and Dridi (2010) mentioned that some industry specialists and academics have argued a similar statement 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 from a theoretical point of view (Boumediene and Caby, 2009). Moreover, existing theoretical studies have not provided clear views 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 were 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.

(a) Islamic banks' NPL was lower and experienced more rapid recovery than that of conventional banks in the post-economic crisis period.



(b) Conventional banks' LDR dropped below 50%, whereas Islamic banks returned over 100%

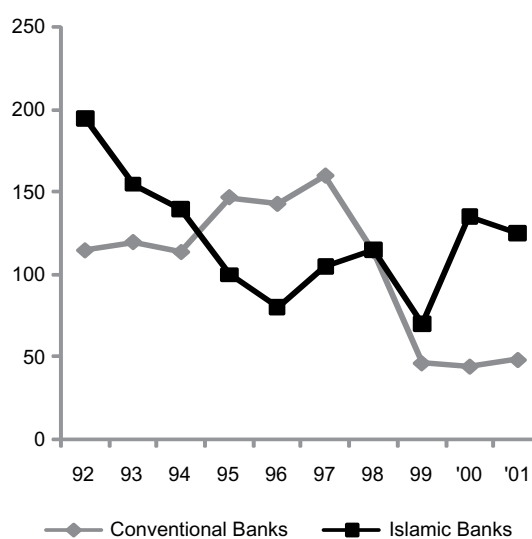


Figure 1. Islamic banking performance in Indonesia 2000–2001.

Source: Bank Indonesia.

Those papers were conducted using cross-country data observation. Some important things should be taken into account related to this methodology. Specifically, cross-country data should have been treated more carefully since every country has its own regional and developmental backgrounds resulting in different definitions of banks (Karwowski, 2009) and different characteristics of the localized 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 covers 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 resulting 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 practicing transactions that are speculative, 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 empirical studies by Beck et al. (2010) also conclude 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 this concentration presents risks in a small number of institutions. In many articles, it 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 from the perspective of the banking system stability were pioneered by Čihák and Hesse (2008). They measured the stability of Islamic banks compared to conventional banks in 18 countries with significant Islamic banking industries over 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 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 does show different risk characteristics than 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 compared 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 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 increases 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, along with 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 considered more of a complement to the existing conventional banking, and thereby helpful in diversifying systemic risk.

From the above description, the understanding of whether and how the stability of Islamic banks differs from conventional banks has still not resulted 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.

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, which 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.¹ 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 Boyd 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) and is as follows:

$$P\left(\text{ROA}_{it} \leq -\frac{\text{EQ}_{it}}{A_{it}}\right) \leq \frac{\sigma_{\text{ROA}_{it}}^2}{\left(\mu_{\text{ROA}_{it}} + \frac{\text{EQ}_{it}}{A_{it}}\right)^2} \equiv \frac{1}{Z_{it}^2} \quad (1)$$

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:

$$Z_{it} = \frac{\mu_{ROAit} + EQ_{it}/A_{it}}{\sigma_{ROAit}} \quad (2)$$

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 . EQ_{it}/A_{it} is the amount of equity to assets ratio of bank i at time t , and μ_{ROAit} is the rate of return on assets of bank i at time t , and σ_{ROAit} is 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 as 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 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.

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

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

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

where $k = 2004, 2005, \dots, 2009$
 $n = 1, 2, \dots, 12$ on year k

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

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 frameworks that underly it. In addition, the Z-score has not covered the factor of contagion among institutions within the system and is considered 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

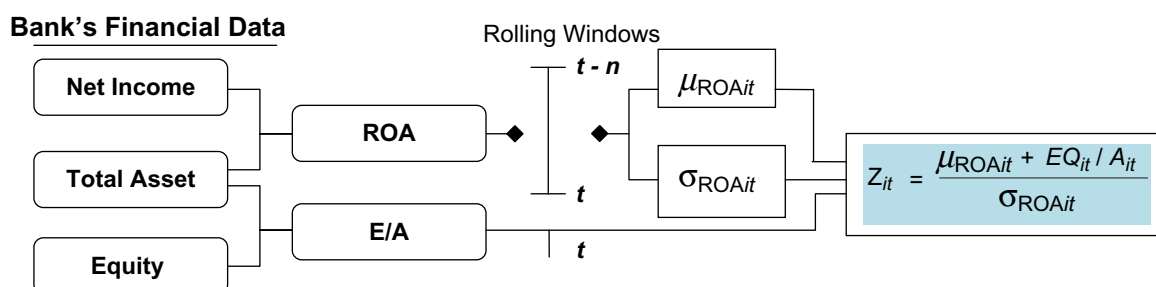


Figure 2. The measurement stages of Z-score.

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.

(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).

3. Data

This study focuses on the banking industry in Indonesia within 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 25 Islamic business units (UUS), which are treated equally as individual banks 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.

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 trillion² 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) 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 – small banks with total assets less than Rp 10 trillion and 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 reached 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.

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).

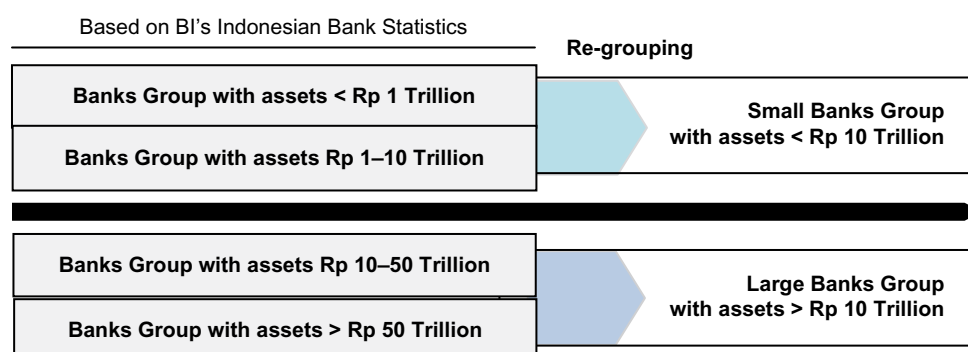


Figure 3. Bank grouping based on total assets.

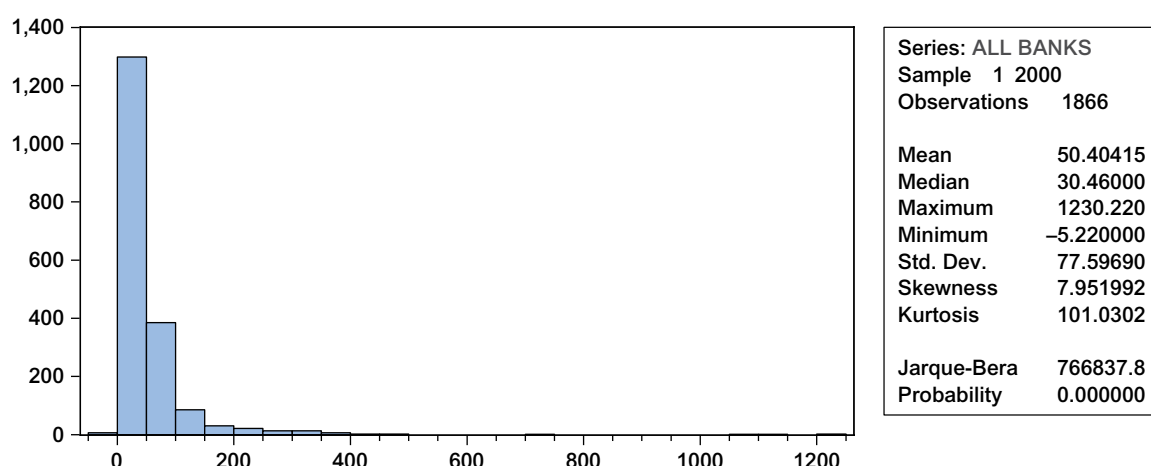


Figure 4. The descriptive statistic of the Z-score measurement (all sample).
 Source: Bank Indonesia, Bank’s quarterly financial report, and author’s calculation.

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 maintain at 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.

4. Findings

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.

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 values of Z-scores. The results of Z-score

measurements 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 tends to be lower than the Z-score value 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 a mean Z-score that tends to be lower than the small Islamic banks, while the median is larger.

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.

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.

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 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 Z-score represents a lower probability of insolvency (Čihák, 2007) and can be used as comparison between groups of data. For other purposes of study, such as econometrical study, the data should be transformed into other forms, such as 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 groups based on the Z-score value. Conversely, there is only one Islamic bank positioned in the top 10 groups, 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 or not 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.

In general, the results of Z-score measurement in the sample groups of conventional banks and Islamic banks are presented on the trends graph of the average Z-score in Figure 6. It is shown 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 – i.e., 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.

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	Mean	0.022	0.010	0.005	0.008	0.027	0.011
ROA	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
	Kurtosis	2.891	8.617	0.638	4.260	2.475	7.754
		7.995	99.302	0.635	21.744	5.480	73.498

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

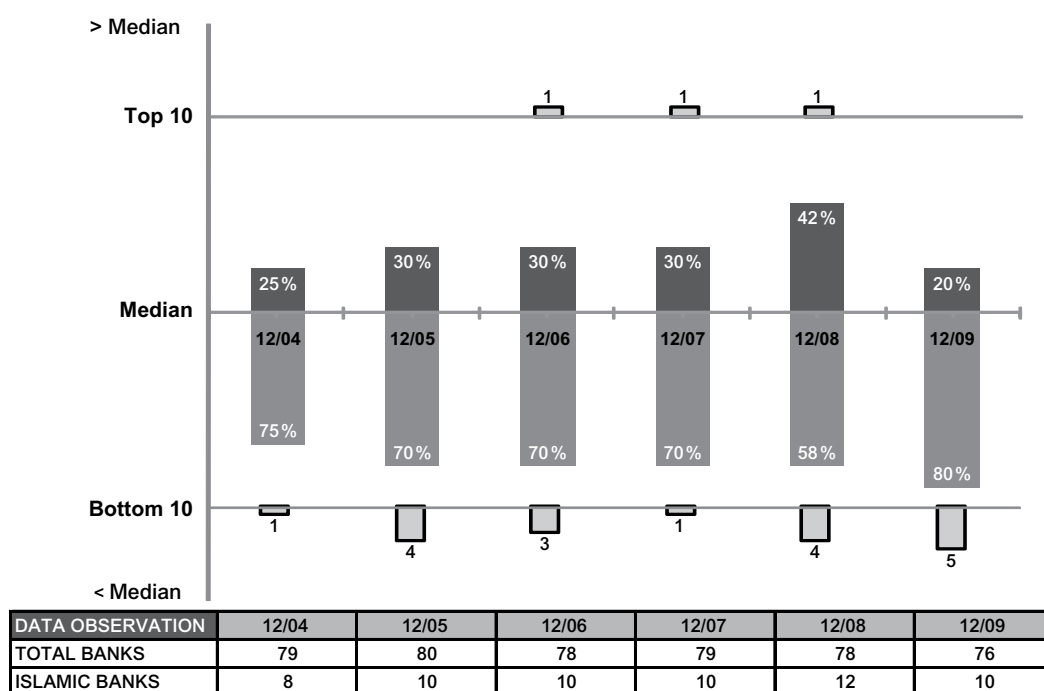


Figure 5. The Islamic bank position of stability (based on median of all samples).
 Source: Bank Indonesia, Bank’s quarterly financial report, and author’s calculation.

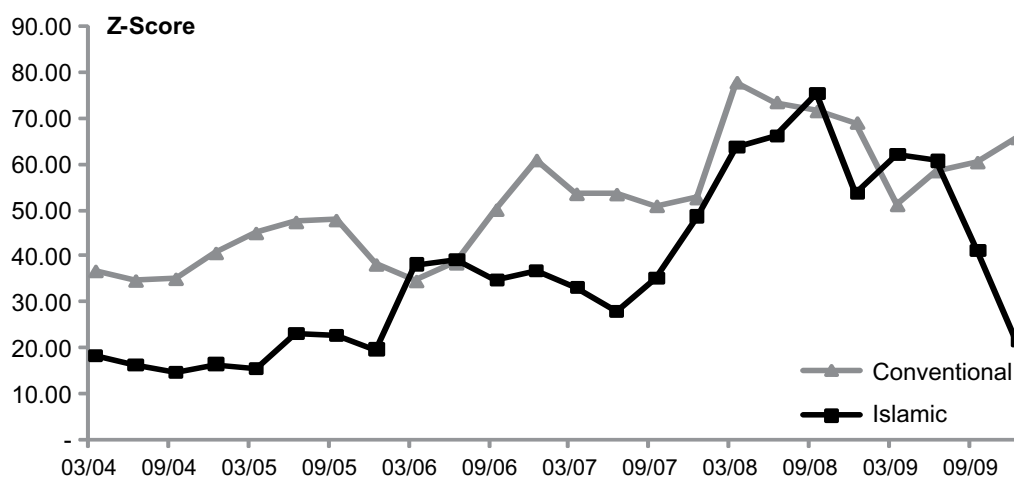


Figure 6. The average Z-score of the conventional banks and Islamic banks, 2004–2009.
 Source: Bank Indonesia, Bank’s quarterly financial report, and author’s calculation.

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.

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.

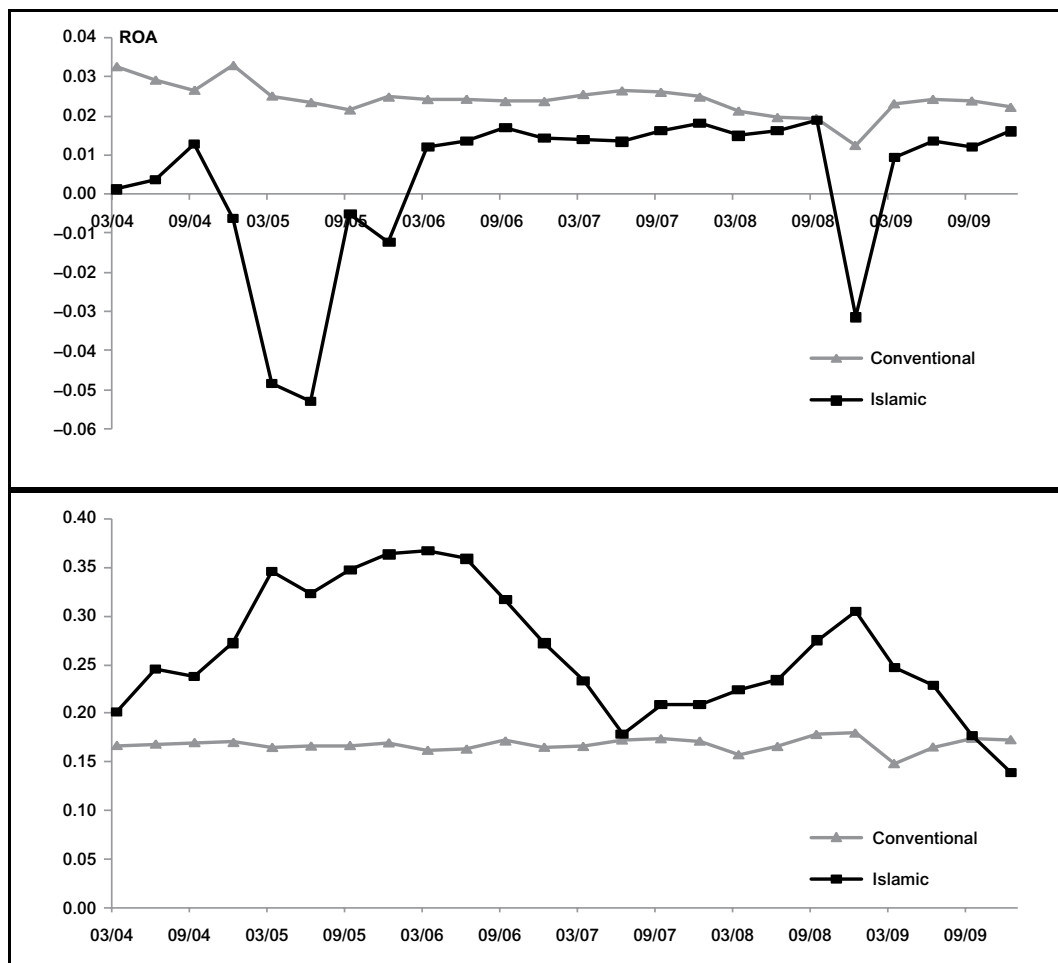


Figure 7. The average ROA and E/A of the conventional banks and Islamic banks, 2004–2009.
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

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. In 2008, some Islamic banks experienced the organizational changes. For example UUS, BRI, and UUS Bukopin spinned-off from their holdings into BUS – thereafter 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 impact 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 slight decrease.

As a development from the study of Čihák and Hesse (2008), we also conducted measurements to gauge the level of stability within the Islamic banking industry, comparing it to 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 – only the working capital that the holding conventional banks must set aside in the form of cash, maintaining 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 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

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.

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 to 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.

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 organizational dynamics such as the conversion type of business or the business activity is in the early stage of operations, where the bank cost 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 demonstrates 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, 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.

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.

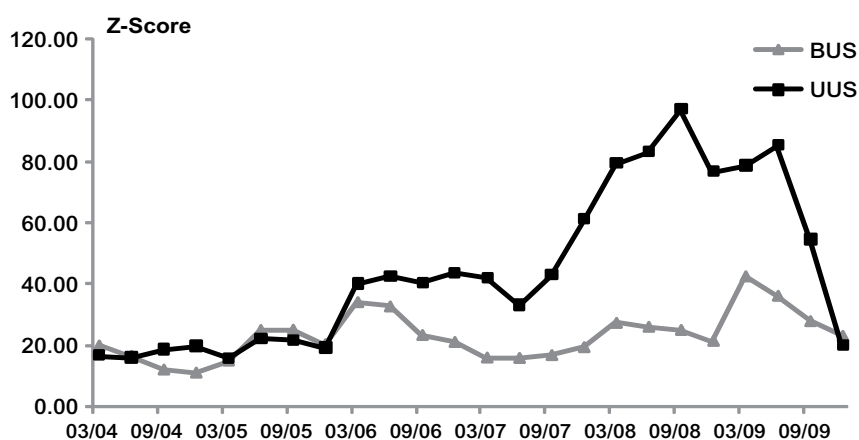


Figure 8. The average Z-score of BUS and UUS, 2004–2009.

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

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		
	μ Convsn.	μ Syariah	σ^2	μ Convsn.	μ Syariah	σ^2	μ Convsn.	μ Syariah	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 $\alpha = 5\%$.

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.

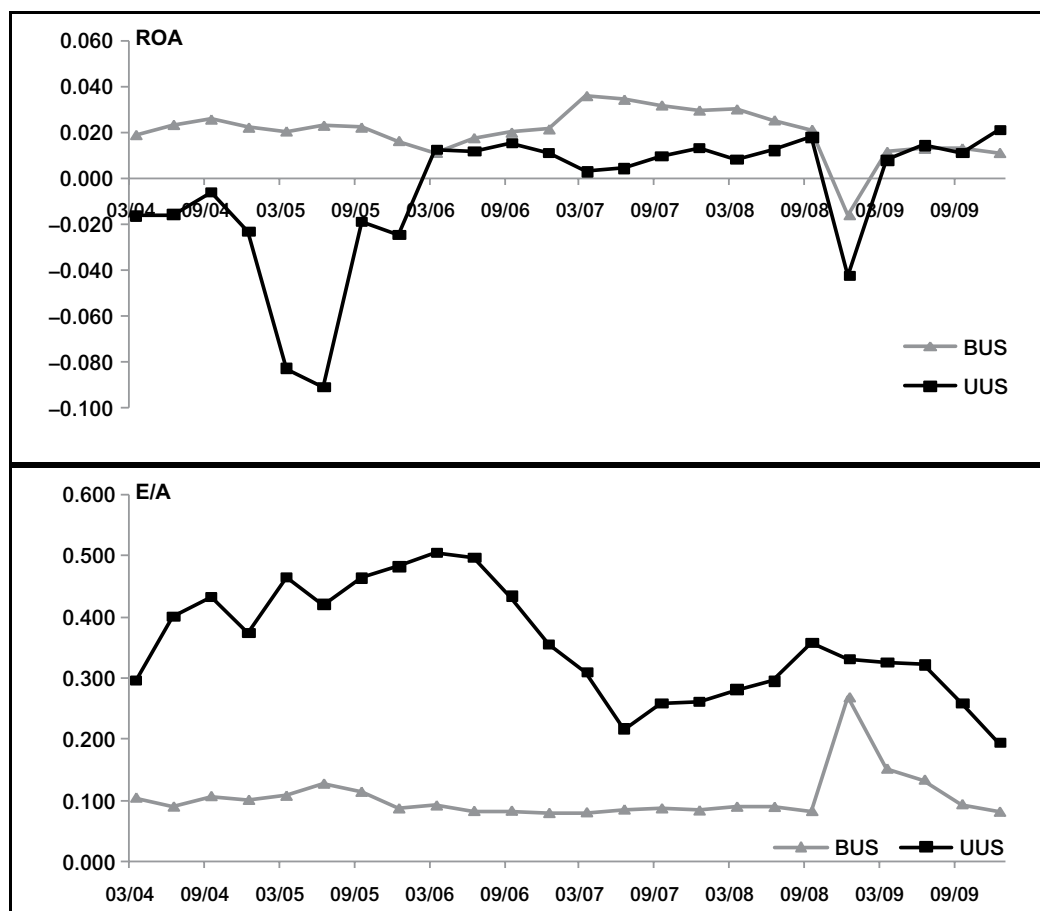


Figure 9. The average ROA and E/A of BUS and UUS, 2004–2009.

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

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 $n_{konvensional} > 30$). From Figure 4 it can be seen that the data are not normally distributed, but as the explanation from Dowdy et al. shows (2004), 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 logarithm, square roots and inverses – 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.³

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

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 a 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 levels 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 zones: 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 show that 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 $\alpha = 5\%$.

σ² 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 a 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 was 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 the organizational change required to resolve some carrying problems such as loss of productive assets, or, as in the case of infant industry (Turk-Ariss, 2010a), the 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 maintained a level of stability better than

BUS. This is supported 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 financial support from the holding conventional banks. There is also a possibility that the Z-score measurement of UUS may be biased since UUS is known to have the problem of “fungibility,” resulting in the challenges to examining it independently from the holding (Karwowski, 2009).

From the measurement applied to the data of individual banks, we also obtained the positioning of each Islamic bank in the banking industry in Indonesia based on its 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.

5. Conclusions

In this paper, we use the Z-score measurement as the indicator of individual bank stability. In the literature on 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 as to contribute 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 levels of stability compared to 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 a tendency to differ when compared. Our finding can be understood given that 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 similar level of resilience among these groups.

The results also differ from 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 given 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 has significantly higher levels 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 be significantly biased, if we rank all samples of banks based on the level of stability, the result still confirms that Islamic banks display 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 what is considered a “good” value of Z-score still has not been determined explicitly, nor has any probability that 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).

Notes

1. 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.
2. With the average exchange rate of about Rp 9.000 per US\$ 1, Rp 1 trillion is equivalent to about US\$ 111 million.
3. One alternative data transformation is by using the function $\ln(1+Z\text{-score})$, 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 truncation at zero.

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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																												
BNI																												
BRI																												
BRI																												
BTN																												
BTN																												
MANDIRI																												
MANDIRI																												
FOREIGN EXCHANGE COMMERCIAL BANKS																												
AGRONIAGA																												
AGRONIAGA																												
ARTHA GRAHA INTL																												
ARTHA GRAHA INTL																												
ARTHA GRAHA																												
ARTHA GRAHA																												
BCA																												
BCA																												
BII																												
BII																												
BNP																												
BNP																												
BUKOPIN																												
BUKOPIN																												
BUMI ARTA																												
BUMI ARTA																												
CAPITAL																												
CAPITAL																												
CIMB NIAGA																												
CIMB NIAGA																												
DANAMON																												
DANAMON																												
EKONOMI																												
EKONOMI																												
GANESHA																												
GANESHA																												
HAGAKITA																												
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HANA																												
HANA																												
ICB BUMIPUTERA																												
ICB BUMIPUTERA																												
ICBC INDONESIA																												
ICBC INDONESIA																												
KESAWAN																												
KESAWAN																												
LIPPO																												
LIPPO																												
MASPION																												
MASPION																												
MAYAPADA																												
MAYAPADA																												
MEGA																												
MEGA																												
MESTIKA																												
MESTIKA																												
MUTIARA																												
MUTIARA																												
OCBC NISP																												
OCBC NISP																												
PANIN																												
PANIN																												
PERMATA																												
PERMATA																												
SAUDARA																												
SAUDARA																												
SBI INDONESIA																												
SBI INDONESIA																												
SINARMAS																												
SINARMAS																												
SWADESI																												
SWADESI																												
UOB BUANA																												
UOB BUANA																												
WINDU																												
WINDU																												
NON-FOREIGN EXCHANGE COMMERCIAL BANKS																												
BTPN																												
BTPN																												
EKSEKUTIF																												
EKSEKUTIF																												
HARDA																												
HARDA																												
INDEX SELINDO																												
INDEX SELINDO																												
JASA JAKARTA																												
JASA JAKARTA																												
KESEJAHTERAAN																												
KESEJAHTERAAN																												
VICTORIA																												
VICTORIA																												
YUDHA BAKTI																												
YUDHA BAKTI																												
JOINT VENTURE BANKS																												
ANZ																												
ANZ																												
BNP PARIBAS																												
BNP PARIBAS																												
CHINA TRUST																												
CHINA TRUST																												
COMMONWEALTH																												
COMMONWEALTH																												
DBS																												
DBS																												
KEB INDONESIA																												
KEB INDONESIA																												
MAYBANK																												
MAYBANK																												
MIZUHO																												
MIZUHO																												
OCBC INDONESIA																												
OCBC INDONESIA																												
RABOBANK																												
RABOBANK																												
RESONA																												
RESONA																												
SUMITOMO																												
SUMITOMO																												
UOB INDONESIA																												
UOB INDONESIA																												
WINDU INTL																												
WINDU INTL																												
WOORI																												
WOORI																												
FOREIGN OWNED BANKS																												
ABN AMRO																												
ABN AMRO																												
BANGKOK BANK																												
BANGKOK BANK																												
BANK OF AMERICA																												
BANK OF AMERICA																												

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	Conventiona	Islamic	Conventiona	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	No.	BANK	Dec 2005	No.	BANK	Dec 2006
1	CITIBANK	326.55	1	BCA	150.78	1	CITIBANK	326.84
2	MESTIKA	277.86	2	MESTIKA	143.63	2	OCBC NISP	322.69
3	ICBC INDONESIA	206.00	3	BANK OF CHINA LTD	134.62	3	ICB BUMIPUTERA	255.45
4	BANGKOK BANK	190.51	4	CITIBANK	118.22	4	PERMATA	237.25
5	SWADESI	123.24	5	BANGKOK BANK	111.67	5	PANIN	202.53
6	HAGAKITA	94.13	6	TOKYO MITSUBISHI	99.50	6	BUMI ARTA	143.88
7	HANA	77.49	7	MAYAPADA	90.82	7	BNIS	125.53
8	BTPN	74.05	8	WOORI	85.00	8	BUKOPIN	115.75
9	SINARMAS	73.97	9	ICBC INDONESIA	82.77	9	MASPION	104.34
10	AGRONIAGA	65.50	10	HAGAKITA	72.27	10	BANK OF CHINA LTD	98.98
11	ICB BUMIPUTERA	50.18	11	INDEX SELINDO	69.52	11	UOB INDONESIA	97.14
12	ANZ	50.03	12	OCBC INDONESIA	68.42	12	WOORI	96.35
13	BUKOPIN	49.96	13	BSB UUS	63.24	13	BII	95.06
14	BNP	48.45	14	SWADESI	63.03	14	BCA	89.23
15	BUMI ARTA	48.04	15	EKONOMI	62.48	15	CIMB NIAGA	84.99
16	UOB BUANA	46.37	16	HANA	57.31	16	MESTIKA	84.19
17	KESEJAHTERAAN	45.72	17	MIZUHO	55.11	17	BRIS UUS	82.10
18	INDEX SELINDO	45.40	18	ANZ	54.06	18	ICBC INDONESIA	76.69
19	BRIS UUS	42.98	19	AGRONIAGA	48.13	19	EKONOMI	72.67
20	OCBC NISP	42.41	20	BUKOPIN	45.20	20	SWADESI	69.67
21	MIZUHO	42.24	21	SBI INDONESIA	45.03	21	UOB BUANA	63.74
22	CHINA TRUST	40.86	22	HAGA	42.81	22	VICTORIA	63.41
23	BCA	39.89	23	BII	42.32	23	SUMITOMO	60.29
24	TOKYO MITSUBISHI	37.36	24	SINARMAS	38.64	24	KEB INDONESIA	59.14
25	WOORI	37.09	25	HSBC	38.26	25	ARTHA GRAHA INTL	57.38
26	EKONOMI	36.91	26	KESEJAHTERAAN	36.28	26	TOKYO MITSUBISHI	57.29
27	UOB INDONESIA	34.72	27	BUMI ARTA	35.27	27	OCBC INDONESIA	54.64
28	PANIN	33.65	28	UOB BUANA	33.89	28	MIZUHO	53.89
29	OCBC INDONESIA	32.12	29	MASPION	33.75	29	ANZ	52.72
30	JASA JAKARTA	31.18	30	CIMB NIAGA	33.57	30	MUTIARA	50.08
31	MANDIRI	28.60	31	BTN	31.01	31	BTNS	48.61
32	RESONA	28.29	32	MUAMALAT	30.57	32	STAN-CHART	48.45
33	HSBC	26.96	33	KEB INDONESIA	30.04	33	INDEX SELINDO	46.90
34	BANK OF CHINA LTD	26.66	34	BNIS	29.92	34	SBI INDONESIA	44.09
35	BNIS	24.98	35	UOB INDONESIA	27.86	35	MAYBANK	40.51
36	SUMITOMO	24.44	36	KESAWAN	27.05	36	MANDIRI	38.62
37	KEB INDONESIA	24.37	37	BNI	26.59	37	KESEJAHTERAAN	38.27
38	MASPION	23.96	38	CHINA TRUST	26.22	38	SINARMAS	37.39
39	VICTORIA	22.43	39	BRI	24.66	39	LIPPO	37.02
40	BRI	22.10	40	RABOBANK	24.46	40	BANGKOK BANK	36.97
41	BSB UUS	19.96	41	DANAMON	24.07	41	MUAMALAT	36.33
42	MAYAPADA	19.77	42	BANK OF AMERICA	23.64	42	KESAWAN	36.10
43	STAN-CHART	18.62	43	BNP	22.87	43	RESONA	34.83
44	GANESHA	17.77	44	SUMITOMO	22.77	44	ABN AMRO	31.24
45	MAYBANK	17.43	45	BRIS UUS	22.46	45	MEGA	31.04
46	HAGA	16.80	46	RESONA	22.32	46	BNP	31.01
47	BII	16.41	47	YUDHA BAKTI	22.21	47	DBS	29.88
48	YUDHA BAKTI	16.04	48	VICTORIA	21.99	48	BRI	27.31
49	MEGA	15.72	49	JASA JAKARTA	21.46	49	MAYAPADA	27.23
50	CIMB NIAGA	15.54	50	GANESHA	21.27	50	BTPN	26.23
51	BNI	14.54	51	MAYBANK	20.97	51	HAGAKITA	26.20
52	EKSEKUTIF	14.15	52	BSM	19.70	52	JASA JAKARTA	25.86
53	ARTHA GRAHA	14.09	53	LIPPO	19.11	53	BTN	25.36
54	SBI INDONESIA	13.74	54	ICB BUMIPUTERA	18.42	54	BNI	25.16
55	COMMONWEALTH	13.44	55	WINDU INTL	18.39	55	WINDU INTL	24.95
56	BANK OF AMERICA	13.38	56	SAUDARA	17.80	56	CHINA TRUST	24.39
57	DBS	12.89	57	OCBC NISP	17.79	57	BSB UUS	24.00
58	MUAMALAT	12.87	58	PANIN	16.59	58	SAUDARA	22.18
59	WINDU INTL	11.99	59	HARDA	15.87	59	HANA	22.12
60	BNP PARIBAS	11.57	60	PERMATA	15.61	60	BSM	21.77
61	HARDA	11.19	61	BTPN	13.39	61	HSBC	19.70
62	MEGAS	11.19	62	MEGAS	10.93	62	BNP PARIBAS	19.10
63	BTN	10.06	63	DBS	10.63	63	COMMONWEALTH	18.99
64	NIAGAS	9.93	64	MEGA	10.41	64	HAGA	18.70
65	BSM	9.07	65	WINDU	10.34	65	DANAMON	15.49
66	RABOBANK	8.49	66	MANDIRI	10.32	66	AGRONIAGA	12.70
67	SAUDARA	7.87	67	BNP PARIBAS	9.68	67	NIAGAS	12.16
68	KESAWAN	7.50	68	ABN AMRO	8.92	68	GANESHA	12.15
69	ARTHA GRAHA INTL	7.45	69	COMMONWEALTH	8.90	69	YUDHA BAKTI	10.36
70	DANAMON	7.23	70	STAN-CHART	6.52	70	BANK OF AMERICA	9.70
71	LIPPO	5.76	71	BDIS	5.54	71	HARDA	8.00
72	DEUTSCHE BANK	5.53	72	PERMATAS	5.32	72	PERMATAS	7.99
73	ABN AMRO	5.06	73	CAPITAL	4.83	73	WINDU	6.67
74	JP MORGAN	4.73	74	DEUTSCHE BANK	4.52	74	CAPITAL	5.42
75	CAPITAL	3.83	75	BTNS	4.46	75	MEGAS	5.21
76	PERMATA	3.69	76	NIAGAS	3.92	76	BDIS	4.99
77	MUTIARA	2.76	77	EKSEKUTIF	2.08	77	EKSEKUTIF	4.97
78	WINDU	0.84	78	JP MORGAN	1.91	78	RABOBANK	3.67
79	PERMATAS	0.56	79	MUTIARA	1.56	79	BRIS BUS	
80	BRIS BUS		80	ARTHA GRAHA INTL	1.19	80	BSB BUS	
81	BSB BUS		81	BRIS BUS		81	ARTHA GRAHA	
82	BDIS		82	BSB BUS		82	DEUTSCHE BANK	
83	BTNS		83	ARTHA GRAHA		83	JP MORGAN	
	MEAN	38.32		MEAN	35.93		MEAN	57.95
	MEDIAN	22.10		MEDIAN	24.26		MEDIAN	37.00
TOTAL OBSERVATION		79	TOTAL OBSERVATION		80	TOTAL OBSERVATION		78
ISLAMIC BANKS OBS.		8	ISLAMIC BANKS OBS.		10	ISLAMIC BANKS OBS.		10
BANK WITH Z > MEDIAN		2	BANK WITH Z > MEDIAN		3	BANK WITH Z > MEDIAN		3
% Z ISLAMIC > MEDIAN		25.00%	% Z ISLAMIC > MEDIAN		30.00%	% Z ISLAMIC > MEDIAN		30.00%
ISLAMIC : TOP 10		0	ISLAMIC : TOP 10		0	ISLAMIC : TOP 10		1
ISLAMIC : BOTTOM 10		1	ISLAMIC : BOTTOM 10		4	ISLAMIC : BOTTOM 10		3

Appendix 3 - Continued

No.	BANK	Dec 2007	No.	BANK	Dec 2008	No.	BANK	Dec 2009
1	CITIBANK	253.10	1	CITIBANK	1,230.22	1	CITIBANK	472.40
2	MASPION	187.11	2	BTNS	317.43	2	BCA	416.46
3	BTNS	173.03	3	BTN	252.01	3	MASPION	331.30
4	UOB BUANA	158.64	4	BANGKOK BANK	196.12	4	UOB INDONESIA	189.77
5	JASA JAKARTA	130.45	5	WOORI	132.19	5	KESAWAN	174.51
6	ARTHA GRAHA INTL	128.21	6	GANESHA	119.92	6	MIZUHO	127.60
7	MAYAPADA	127.05	7	BUKOPIN	97.72	7	BUKOPIN	115.96
8	MESTIKA	115.01	8	BCA	90.05	8	DANAMON	113.00
9	WINDU INTL	111.25	9	EKONOMI	85.63	9	BUMI ARTA	110.84
10	BRI	106.66	10	TOKYO MITSUBISHI	76.49	10	PERMATA	105.44
11	BNIS	104.99	11	OCBC NISP	73.50	11	BANGKOK BANK	97.04
12	UOB INDONESIA	98.33	12	BRI	73.22	12	BSM	92.02
13	BANGKOK BANK	97.79	13	ARTHA GRAHA INTL	72.87	13	MESTIKA	90.22
14	BUKOPIN	91.31	14	JASA JAKARTA	72.47	14	ARTHA GRAHA INTL	85.33
15	JP MORGAN	88.20	15	BUMI ARTA	72.14	15	TOKYO MITSUBISHI	81.19
16	KEB INDONESIA	79.32	16	KEB INDONESIA	69.20	16	MAYAPADA	78.65
17	OCBC NISP	78.46	17	MANDIRI	68.17	17	SBI INDONESIA	75.39
18	BCA	76.19	18	BNIS	66.13	18	MANDIRI	75.16
19	PANIN	74.82	19	SBI INDONESIA	65.64	19	WOORI	72.38
20	WOORI	74.39	20	SINARMAS	64.62	20	MAYBANK	69.65
21	EKONOMI	72.36	21	CAPITAL	63.95	21	BTN	65.42
22	TOKYO MITSUBISHI	71.68	22	MESTIKA	61.61	22	MEGA	62.82
23	BII	65.33	23	BSB UUS	59.67	23	KEB INDONESIA	61.36
24	BUMI ARTA	64.08	24	MEGA	58.11	24	PANIN	61.08
25	CIMB NIAGA	61.00	25	VICTORIA	58.09	25	EKONOMI	59.80
26	SWADESI	60.39	26	INDEX SELINDO	56.09	26	BANK OF AMERICA	54.44
27	BRIS UUS	51.67	27	KESAWAN	53.96	27	CAPITAL	53.05
28	OCBC INDONESIA	47.86	28	NIAGAS	51.95	28	UOB BUANA	51.89
29	MUTIARA	47.07	29	MAYAPADA	51.88	29	OCBC NISP	51.38
30	GANESHA	45.94	30	CHINA TRUST	50.51	30	BANK OF CHINA LTD	51.03
31	KESEJAHTERAAN	42.00	31	ICBC INDONESIA	46.90	31	SWADESI	50.12
32	BTN	40.85	32	UOB INDONESIA	46.43	32	BTNS	49.12
33	BNP	40.25	33	MIZUHO	45.53	33	JASA JAKARTA	47.87
34	PERMATA	39.84	34	SUMITOMO	45.19	34	DBS	47.25
35	HAGAKITA	38.16	35	SWADESI	43.83	35	BRI	44.57
36	INDEX SELINDO	37.96	36	PANIN	42.16	36	ICBC INDONESIA	44.19
37	CAPITAL	36.95	37	BNI	41.72	37	SUMITOMO	42.98
38	ANZ	35.88	38	BSM	40.76	38	WINDU INTL	39.35
39	BTPN	34.14	39	ICB BUMIPUTERA	40.16	39	INDEX SELINDO	38.19
40	SBI INDONESIA	33.28	40	AGRONIAGA	39.89	40	SINARMAS	33.87
41	NIAGAS	32.27	41	YUDHA BAKTI	39.75	41	BNI	32.01
42	BNP PARIBAS	32.08	42	BTPN	38.47	42	CHINA TRUST	31.83
43	DANAMON	31.83	43	KESEJAHTERAAN	38.39	43	HANA	29.80
44	BSB UUS	31.14	44	OCBC INDONESIA	37.91	44	VICTORIA	28.64
45	CHINA TRUST	29.03	45	DBS	37.67	45	OCBC INDONESIA	25.68
46	HANA	28.90	46	BNP	36.89	46	HARDA	24.03
47	MIZUHO	27.32	47	HSBC	36.81	47	GANESHA	22.88
48	HSBC	26.47	48	BANK OF CHINA LTD	36.75	48	BDIS	21.80
49	LIPPO	25.89	49	BANK OF AMERICA	36.59	49	ICB BUMIPUTERA	21.22
50	KESAWAN	25.16	50	MASPION	34.97	50	YUDHA BAKTI	20.80
51	BNI	25.10	51	WINDU INTL	33.39	51	RABOBANK	19.92
52	SUMITOMO	24.46	52	MUAMALAT	32.90	52	BNP PARIBAS	19.88
53	ICB BUMIPUTERA	23.29	53	UOB BUANA	31.78	53	KESEJAHTERAAN	19.56
54	SAUDARA	22.35	54	MAYBANK	31.61	54	HSBC	19.53
55	ICBC INDONESIA	21.81	55	ANZ	31.20	55	BNP	18.93
56	YUDHA BAKTI	21.79	56	HARDA	30.32	56	COMMONWEALTH	18.68
57	ABN AMRO	21.66	57	SAUDARA	30.15	57	STAN-CHART	16.76
58	MANDIRI	21.32	58	PERMATA	29.70	58	ABN AMRO	16.37
59	BSM	21.02	59	BDIS	29.61	59	BII	16.10
60	SINARMAS	20.45	60	BII	26.73	60	SAUDARA	15.92
61	DBS	20.41	61	JP MORGAN	26.50	61	RESONA	15.66
62	MUAMALAT	20.28	62	DANAMON	21.41	62	PERMATAS	14.41
63	AGRONIAGA	19.61	63	BRIS BUS	18.69	63	AGRONIAGA	14.06
64	VICTORIA	19.39	64	HANA	18.57	64	DEUTSCHE BANK	14.06
65	RESONA	19.22	65	COMMONWEALTH	18.27	65	BTPN	12.87
66	COMMONWEALTH	19.14	66	CIMB NIAGA	17.13	66	MEGAS	12.08
67	MAYBANK	19.12	67	STAN-CHART	16.11	67	NIAGAS	11.44
68	PERMATAS	17.77	68	RESONA	16.10	68	CIMB NIAGA	9.55
69	BDIS	17.52	69	ABN AMRO	12.60	69	JP MORGAN	8.13
70	MEGAS	16.92	70	BNP PARIBAS	11.79	70	ANZ	7.35
71	DEUTSCHE BANK	15.45	71	DEUTSCHE BANK	11.56	71	MUAMALAT	6.46
72	MEGA	14.97	72	RABOBANK	11.44	72	BNIS	3.54
73	BANK OF CHINA LTD	13.81	73	PERMATAS	11.21	73	BSB BUS	2.50
74	HAGA	13.57	74	EKSEKUTIF	9.84	74	BRIS BUS	2.45
75	STAN-CHART	13.20	75	BSB BUS	8.45	75	EKSEKUTIF	2.02
76	RABOBANK	12.31	76	MEGAS	6.56	76	MUTIARA	(0.04)
77	BANK OF AMERICA	8.58	77	BRIS UUS	1.83	77	BRIS UUS	
78	EKSEKUTIF	6.71	78	MUTIARA	(0.68)	78	BSB UUS	
79	HARDA	2.26	79	ARTHA GRAHA		79	ARTHA GRAHA	
80	BRIS BUS		80	HAGAKITA		80	HAGAKITA	
81	BSB BUS		81	HAGA		81	HAGA	
82	ARTHA GRAHA		82	LIPPO		82	LIPPO	
83	WINDU		83	WINDU		83	WINDU	
MEAN		52.21	MEAN		66.83	MEAN		60.01
MEDIAN		33.28	MEDIAN		40.02	MEDIAN		38.77
TOTAL OBSERVATION		79	TOTAL OBSERVATION		78	TOTAL OBSERVATION		76
ISLAMIC BANKS OBS.		10	ISLAMIC BANKS OBS.		12	ISLAMIC BANKS OBS.		10
BANK WITH Z > MEDIAN		3	BANK WITH Z > MEDIAN		5	BANK WITH Z > MEDIAN		2
% Z ISLAMIC > MEDIAN		30.00%	% Z ISLAMIC > MEDIAN		41.67%	% Z ISLAMIC > MEDIAN		20.00%
ISLAMIC : TOP 10		1	ISLAMIC : TOP 10		1	ISLAMIC : TOP 10		0
ISLAMIC : BOTTOM 10		1	ISLAMIC : BOTTOM 10		4	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).



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