COMPARATIVE ANALYSIS OF BANK STABILITY IN INDONESIA: A NON-PARAMETRIC APPROACH ON DIFFERENT BANKING MODELS

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Abstract

The present study, grounded in theory of financial intermediation, provides new empirical evidence on comparison of bank stability measures of Islamic banks, conventional banks and other bank models in Indonesia. Specifically, 72 conventional banks, 4 Islamic banks, 3 conventional banks with Islamic subsidiaries and 2 subsidiary Islamic banks in Indonesia are considered, focusing on the sample period of 1999-2015. The study adopts z-score as a measure of bank stability, while a non-parametric multiple comparison analysis was used to test the significance of the differences in the bank stability of the different bank models, namely Islamic banks, conventional banks, Subsidiary Islamic banks and conventional banks with Islamic subsidiaries. The sample period is further divided into three sub-periods, namely, before the global financial crisis (1999-2006), during the global financial crisis (2007-2009) and after the global financial crisis (2010-2015) so as to gain more detail findings on the impact of the global financial crisis on the banks' stability. The impact of local crisis periods (1999-2001) on bank stability of different bank models is also investigated. Findings of this study contribute towards extending the theory of financial intermediation through empirical works of stability of different banking models namely Islamic banks, conventional banks, Subsidiary banks and conventional banks with Islamic subsidiaries.

Keywords: Bank Stability, Z-Score, Islamic Bank, Conventional Bank, Crisis

JEL Classification: M2, M20

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I. INTRODUCTION

During the 1997 Asian financial crisis, in which the Indonesian rupiah was devalued by more than 80%, several weak underlying factors in the banking sector were identified: ineffective banking supervision, high numbers of delinquent loans and high levels of connected lending in many private banks (Enoch, Baldwin, Frecaut, and Kovanen, 2001). As a result of these underlying weaknesses, the banking sector was badly hit by the crisis. Four initial waves of bank closures lead to the closure of 16 banks, followed by 48 banks in three other waves (Enoch, 2000; Enoch et al., 2001). These bitter pills of bank closures were accompanied by bank mergers, restructuring and take-overs by the Indonesia Bank Restructuring Agency (Enoch, 2000; Enoch et al., 2001). The crisis has also became a local crisis for as it has affected the local banks in terms of performance and stability. In addition, the recent 2007-2009 global financial crisis has also resulted in a series of failure of many conventional banks and led to an increased interest in the re-assessment of the stability of conventional banks model. The issues of financial stability and bank stability have always been of interest of the central banks around the world since both has direct bearing on the sustainability of the banking industry itself.

In view of the increasing efforts to re-examine the stability of the financial system based on the conventional banking model, interest on the Islamic banking model has intensified. Various studies (see, for example, Kassim & Majid, 2010; Ariss, 2010; Bourkhis & Nabi, 2013) found that there is no significant different between Islamic and conventional banks. On the other hand, many studies have found that the Islamic banks (IB) are less riskier than conventional banks (CB) (Pappas, Izzeldin, & Fuertes, 2012) and IB performed better than CB, in terms of capital adequacy ratio, return on average assets, return on average equity and earnings over total assets, in normal and crisis period (Parashar & Venkatesh, 2010). However, few studies look at the banks stability of both IB and CB. A study by Rajhi & Hassairi (2013) found that IB are more stable than CB, while, Bourkhis & Nabi (2013) documented no significant effect of crisis on the stability of Islamic and conventional banks in terms of bank soundness. In this study, z-score is used as an indicator for bank stability. The difference in the literature couple with recent local and global crises, this provides an urgent need to investigate the difference between bank stability of Islamic banks, conventional banks and other bank models.

The remaining part of this paper is structured as follows. Section 2 reviews the literature on theory of financial intermediation and bank

stability measures. Section 3 presents the data and methodology. Section 4 discusses the findings and lastly, the conclusion is drawn in section 5.

II. LITERATURE REVIEW

2.1 Theory of Financial Intermediation

The theory of financial intermediation developed by Leland & Pyle (1977) stated that financial intermediation is a manifestation of asymmetric information and later introduced a signalling model. Campbell & Kracaw (1980) further explained that the signalling model and production of information are the main responses to issues in financial intermediation: (i) imperfect market information and (ii) absence of Rational Expectation Equilibrium. Grossman & Stiglitz (1980) further extended the Rational Expectation Model in respect to the asymmetric of information. The role of the financial intermediaries according to Elgari (2003) is basically matching of the surplus unit (sources of funds) with the deficit unit (users of funds). Elgari (2003) further differentiate between the role of Islamic and conventional banks in term of the details of intermediation where the conventional borrow from surplus unit and later lend to the deficit unit, while the Islamic banks participate in Mudharabah or involve in intermediation either with the surplus unit (for source of funds) or deficit unit (for uses of funds).

The role of bank as financial intermediaries also evolves from a simple issue of asymmetric information to the complex issue of risk management. Diamond & Dybvig (1983) explained the causes of bank instability are due to mismatch of liquidity from asset side of the bank with liability side of the bank as the bank lending (asset) tends to be more illiquid than the customer's deposit (bank's liability), resulting in banks' asset to be risky. Additionally, the financial intermediary is also involved in diversification of risk (Elgari, 2003). Risk management, therefore, is very important in bank management. In the context of the Islamic banks, El-Hawary, Grais, & Iqbal (2007) explained the types of risk that the Islamic banks are exposed to and the regulation required in managing these risks.

Several scholars such as (Chapra, 1996; Abozaid & Dusuki, 2007; Chapra, 1995) discussed the different roles of financial intermediation in Islamic and conventional banks. Chapra (1996) used terminology as 'Interest-based financial intermediation' to refer to the financial intermediation in conventional bank and 'Equity based financial intermediation' to refer to the financial intermediation in Islamic bank.

According to Chapra (1996), as the 'Interest-based financial intermediation' depends heavily financing projects based on available collateral and deposit based on the surplus sector, these have been the foundation of considerable spending and speculation. It is argued by Chapra (1996) that the inequality is apparent as the share of the economy is more on the rich sector of the society. This is however according to Chapra (1996), is prohibited in Islam and thus changing the structure of financial intermediation on the basis of profit-and-loss sharing. The 'Equity based financial intermediation' circumvents considerable spending and speculation as the profit-and-loss sharing would encourage only need-based consumption and productive investment (Chapra, 1996). It is argued by Chapra (1996) that the profit sharing ratio between entrepreneur and banks is more stable than interest rate because it will depend more on the business outcomes than other things. Based on this, Chapra (1996) strongly argued that 'Equity based financial intermediation is more stable and reduce the macroeconomic shocks than 'Interest based financial intermediation' as eliminate the unproductive elements in the economy. This view is supported by Abozaid & Dusuki (2007) that the profit and loss financial intermediation supports the small and medium industries in the economy and noted in earlier research by Chapra (1995) as minimizing wasteful and unnecessary consumption and promoting investment for need fulfillment, exports, and increasing employment and self- employment.

2.2 Measuring Bank Stability

The principle of 'Safety First' was developed based on Roy (1952)'s dissatisfaction over the simple rule of maximizing return and also his traumatic wartime experience (Sullivan, 2011). The application of the principle of Safety First means that when having wide range of possible actions, including disasters, the gross return should not be less than some quantity (Roy, 1952). The development of this principle leads to z-score, which indicates the distance from insolvency combining accounting measures of profitability, leverage and volatility (Rajhi & Hassairi, 2013). The z-score is inversely related to the probability of a bank's insolvency, i.e., the probability that the value of its assets will become lower than the value of the debt which means that higher z-score corresponds to a lower risk of insolvency (Rajhi & Hassairi, 2013).

The z-score is also a measure of the distance-to-default, which measures the market value of a bank's assets in relation to the book value of its liabilities (Rajhi & Hassairi, 2013). Thus, the higher is z-score, the less

likely of probability of insolvent and hence, the stable is the bank. It can also be explained that the higher is the z-score, the stable is the bank. Z-score is denoted as follows: $Z=(\mu+K)/\sigma$ where μ denotes the bank's average return on assets (ROA), K the equity capital in percentage of total assets and σ is the standard deviation of the ROA as a proxy for return volatility (De Nicolo, 2000). Many studies used z-score as measure of bank insolvency risk (Rahman, 2010), bank soundness (Bourkhis & Nabi, 2013; Beck et. al, 2013) and bank stability (Hsieh, Chen, & Lee, 2013; Rajhi & Hassairi, 2013).

2.3 Banking Models in Indonesia

Most Muslim-majority countries, including Indonesia have adopted an Islamic banking system, a conventional banking system or a dual banking system (International Shari'ah Research Academy (ISRA), 2011). Islamic banking systems practice only Shari'ah-compliant financial systems, whereas conventional banking systems practices conventional or traditional financial systems that allow interest-based transactions. As for Indonesia, it has adopted the dual banking systems which allow Islamic and conventional banks to operate side by side, as presented in Figure 201 (ISRA, 2011).

The overall financial system in dual banking systems, which can have five types of financial institutions or banking models: conventional banks, conventional banks with Islamic windows, conventional banks with Islamic subsidiary banks, subsidiary Islamic banks and Islamic banks (ISRA, 2011). ISRA (2011) uses Malaysia as a case study for countries with dual banking systems and defines a full-fledged Islamic bank as a bank that complies with Shari'ah and is either newly established or converted from a conventional bank. Subsidiary Islamic banks are either newly established or converted from existing Islamic windows.

Both Islamic windows and subsidiary Islamic banks comply with Shari'ah rules and regulations. However, an Islamic bank has a single board of directors which consists of directors and Shari'ah advisors, while a subsidiary Islamic bank has a board of directors separate from the Shari'ah supervisory board. Conventional banks are defined as financial institutions that practice interest-based transactions. Conventional banks with Islamic subsidiary banks also engage in interest-based transactions but also are the holding company with a majority share (normally 100%) in its subsidiary Islamic banks. However, other researches simply identify banking models as Islamic banks and conventional banks (e.g. Srairi, 2009; Shafique, Hussain,

and Hassan, 2013; Shahid, Rehman, Niazi, and Raoof, 2010; Hamza and Kachtouli, 2014; Ashraf, 2013).

2.4 Objectives of Study

Several studies have pointed out that the Islamic financial system is more stable than the conventional system, due to different separate functional to the deposit and loan in the banks (Khan, 1986) and conventional banks have inequality between liabilities, short-term deposits and long- term investments (Mohammed Seidu, 2009). Islamic financial systems deal more on real sector than the unsubstantiated contracts without the underlying assets, transfer risk in the sale contract (Khan, 1986) and share risk in other contracts Mohammed Seidu (2009). Bourkhis & Nabi (2013) found that the Islamic banks in 11 selected countries such as Bahrain, Bangladesh, Brunei, Egypt, Gambia, Indonesia, Jordan, Kuwait, Malaysia, Mauritania, Pakistan, Qatar, Saudi Arabia, Tunisia, United Arab Emirates and Yemen, are more sound (represented z-score) than conventional banks over their sampling period of 1998-2009. The similar finding is reported by Rajhi & Hassairi (2013) for a study over 6 Southeast Asian and 10 MENA countries over a period 2000-2008. However, Bourkhis & Nabi (2013) found no evidence that the Islamic banks are more sound (represented by z-score) than conventional banks during the crisis period of 2007-2008. This is in contradiction to the finding by Parashar & Venkatesh (2010), that IB performed better than CB in normal and crisis period. Thus, the objectives of this study are to examine and compare bank stability of Islamic banks, conventional banks, Subsidiary Islamic banks and conventional bank with Islamic subsidiaries. The stability of these bank models are investigated over different periods which are: i) sampling periods ii) local crisis period iii) before the global crisis period (GFC) iv) during the GFC period v) after the GFC period.

III. DATA AND METHODOLOGY

3.1 Data

The sample consists of 72 conventional banks, 4 Islamic banks, 3 conventional banks with Islamic subsidiaries and 2 subsidiary Islamic banks in Indonesia, operating Indonesia. The selection of the sample is also based on complete data availability for the banks during the stated period. The analysed time period of these samples is from 1999 to 2015. In order to

evaluate the bank stability over these period of study, these periods are divided into the period i) sampling period (1999-2015), ii) before the global crisis (1999-2006), iii) during the global crisis (2007-2009), iv) after the global crisis (2010-2015) and v) during the local crisis (1999-2001). Data is gathered from the Bankscope database produced by the Bureau Van Dijk.

3.2 Methodology

In the comparative analysis, the between- or within-group comparisons are very sensitive to the normality distribution of the data. The null hypothesis for the two sample Kolmogorov-Smirnov tests is the equality and normality of the data distribution. Rejection of the null hypothesis implies that the sample data are not normally distributed. The normality in distribution of the variables justifies comparative analysis with parametric tests, while violations of normality warrant using non-parametric tests, including the Wilcoxon signed ranks, Mann-Whitney U, Friedman and Kruskal-Wallis tests (Corder and Foreman, 2009).

Since the the normality test is not adhered, the study employs the non-parametric Mann-Whitney U-test or Stata's version of the two-sample Wilcoxon rank-sum (Mann-Whitney) test and Kruskal-Wallis equality of populations rank test. Stata is an integrated statistical software package for data analysis. Wilcoxon signed ranks and Friedman tests are not suitable for this study as the samples involve unbalanced panel data and observed crises periods of unequal length (before the GFC: 1999–2006, during the GFC: 2007–2009, after the GFC: 2010–2015).

The Kruskal-Wallis test explores the differences in scores of a non-parametric dependent variable for more than two groups of a single independent variable from the same population. A non-parametric equivalent to the parametric analysis of variance (ANOVA), the Kruskal-Wallis test also ranks the dependent variable scores and assigns to relevant groups. This statistical test also determines whether the rankings of groups indicate significant differences but does not identify the sources of difference. This test, therefore, is applied to determine differences in the stability of bank models in the selected dual banking countries, and the Mann-Whitney rank test is used next to determine the sources of differences.

The Mann-Whitney rank U-test or STATA's version of two-sample Wilcoxon rank-sum test identifies statistical differences between the two groups of single categorical independent variables i.e. bank model and crisis

period). The differences are ranked by magnitude and summed. Next, the statistical test determines whether the rankings of the two categorical variables reflect statistically significant differences. This test also is very useful to locate the sources of significant differences identified by the Kruskal-Wallis test.

3.3 Variable and Variable Measurement

In evaluating and analysing the stability of these banks, the z-score is used as a measure of bank stability. This stability ratio measure is not new in the literature. The method was used as early as 1952 by Roy as measure of probability of disaster while later used as a measure of bank insolvency risk (Rahman, 2010), bank soundness (Bourkhis & Nabi, 2013; Beck et. al, 2013) and bank stability (Hsieh, Chen, & Lee, 2013; Rajhi & Hassairi, 2013).

The z-score is measured by Return on Asset (ROA) plus Earning to Total Asset (E/TA) divided by standard deviation on ROA. ROA is measured by Return on Average Asset (ROAA) and defined by Bankscope as a ratio of returns generated from the assets financed by the bank. E/TA is defined by Bankscope as a ratio that measure the amount of protection afforded to the bank by the equity the bank has invested in it. The standard deviation of ROA is manually computed.

IV. ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics

Table 4.1 summarizes descriptive statistics of z-score, earnings to total assets and return on average assets used in this study. The bank stability for Islamic (IBs) and conventional banks (CBs), as represent by mean of z-score, were 36.25 and 18.49 respectively. The higher is the mean implies the more stable is the bank. The higher mean of z-score for Islamic banks suggests that Islamic banks are more stable than conventional banks. Generally, based on the mean score, IBs are more stable as compared to CBs during the periods under study.

In Table 1, it is noted that the z-score, earnings to total assets and return on average assets, for Islamic and conventional banks are not normally distributed, as indicated by one of the K-S test and the combined Kolmogorov-Smirnov test. This is also supported by the skewness and kurtosis tests for normality in which the data for bank stability are not

normally distributed. These results, therefore, suggest that the comparative analysis should employ non-parametric tests rather than parametric tests to avoid spurious results from comparisons between and within two or more groups. This was further tested using non-parametric test and discussed in the next section.

Table 1.
Descriptive statistics and Normality Tests

Variables	Obs	Mean	Std Dev	K-S test*	Combined K-S test	Univariate normality test
Z-score (IB)	75	36.25	59.91	0.867	0.003***	0.000***
Z-score (CB)	876	18.49	18.76	0.001		
Earnings to total assets (IB)	75	18.09	15.82	0.344	0.048**	0.000***
Earnings to total assets (CB)	877	12.29	11.35	0.024		
Return on average assets (IB)	75	0.89	3.66	0.013	0.025**	0.000***
Return on average assets (CB)	876	1.01	4.37	0.808		

*significance at 10%   **significance at 5%   ***significance at 1%

4.2 Stability Results

In Table 2, the results of the two-sample Wilcoxon rank-sum (Mann-Whitney) test reveals statistical significant differences in the p-value at the 5% level between the stability of Islamic banks and conventional banks. The sum of Islamic banks' ranks is higher than the sum of the conventional banks' ranks, when compared to the expected sum. Thus, the result suggests that Islamic banks are relatively more stable than conventional banks, during the sampling period of 1999-2015.

Table 2.
Results of two-sample Wilcoxon rank-sum (Mann-Whitney) test

No	Bank model	Rank sum	Expected	Z-statistics	p-value
1.	Islamic banks	**41,114**	35,700		
2.	Conventional banks	411,562	416,976	2.371	**0.0177****

*significance at 10%   **significance at 5%   ***significance at 1%

In Table 3, the Kruskal-Wallis rank test is applied to investigate the bank stability of Islamic banks and conventional banks for given periods: (periods of local crises and before, during and after the GFC). Next, the Wilcoxon rank-sum (Mann-Whitney) test is used to investigate the sources of differences in bank stability for a given crisis period.

In Table 3, the results of the Kruskal-Wallis rank test reveal statistically insignificant differences, as indicated by the chi-square value and insignificant p-value. This suggests that there no evidence that the stability of Islamic banks differ from conventional banks during different periods of local crises and before, during and after the GFC.

Table 3.
Results of two-sample Wilcoxon rank-sum (Mann-Whitney) test

Crisis periods	Obs	Rank Sum	Chi-square (df)	P-value
Local crisis (1999-2001)	115	51,218.50		
Before GFC (2002-2006)	228	110,149.00	2.118	0.5482
GFC (2007-2009)	170	79,395.50		
After GFC (2010-2015)	438	211,913.00		

*significance at 10%   **significance at 5%   ***significance at 1%

Even though the Kruskal-Wallis rank test suggest insignificant different between Islamic banks and conventional banks during different periods, the study proceeds to investigate the sources of difference. The study performs two-sample Wilcoxon rank-sum (Mann-Whitney) test to investigate the sources of differences in the stability of Islamic and conventional banks in different crisis periods. In Table 4, the results of the two-sample Wilcoxon rank-sum (Mann-Whitney) test reveals statistical significant differences in the p-value at the 10% level between the stability of Islamic banks and conventional bank before the GFC. The sum of Islamic banks' ranks is higher than the sum of the conventional banks' before the GFC as compared to the expected sum. Thus, the result suggests that Islamic banks are relatively more stable than conventional banks, based on the higher rank sum of BSI before the GFC.

During the other periods, i.e. during local crisis, during GFC and after GFC, the sum of Islamic banks' ranks is higher than the sum of conventional banks. These results suggest that Islamic banks are relatively more stable than conventional banks. However, this difference is not statistically significant, so it provides no evidence of differences in the stability Islamic banks and conventional banks during local crises, during GFC and after GFC.

Table 4.

Results of two-sample Wilcoxon rank-sum (Mann-Whitney) test for the sources of difference

No	Type of crisis / Bank model	Rank sum	Expected	Z-statistics	p-value
1.	*Local crisis*				
	Islamic banks /	**548**	406	0.608	0.5430
	Conventional banks	6,212	6,264		
2.	*Before GFC*				
	Islamic banks /	**3,133**	2,633.5	1.665	**0.0959***
	Conventional banks	22,973	23,472.5		
3.	*GFC*				
	Islamic banks /	**1,369**	1,111.5	1.510	0.1311
	Conventional banks	13,166	13,423.5		
4.	*After GFC*				
	Islamic banks /	**7,698**	7,024	0.978	0.3283
	Conventional banks	88,443	89,117		

*significance at 10%   **significance at 5%   ***significance at 1%

The study then expand the classification of banks where the Islamic banks are re-classified into full-fledged Islamic banks (IB) and Subsidiary Islamic banks (SIB) while the conventional banks are re-classified into full-fledged conventional banks (CB) and conventional with Islamic subsidiaries (CBS). In Table 4.5, the Kruskal-Wallis rank test is applied to investigate the difference in the bank stability of Islamic banks, conventional banks, conventional banks with Islamic subsidiary banks and subsidiary Islamic banks. The results of the Kruskal-Wallis rank test reveal statistically insignificant differences, as indicated by the chi-square value and insignificant p-value. This provides no evidence that there is difference in the stability of Islamic banks, conventional banks, conventional banks with Islamic subsidiary banks and subsidiary Islamic banks.

Table 5.
Results of Kruskal-Wallis rank test with bank models as the grouping variable

Bank Models	Obs	Rank Sum	Chi-square (df)	P-value
Islamic banks	27	10,805		
Conventional banks	789	373,131		
Subsidiary Islamic banks	46	25,183	5.482	0.1397
Conventional bank with Islamic subsidiaries	89	43,557		

*significance at 10%   **significance at 5%   ***significance at 1%

Even though the Kruskal-Wallis rank test suggests insignificant different in the bank stability of Islamic banks, conventional banks, conventional banks with Islamic subsidiary banks and subsidiary Islamic banks, the study investigates the sources of difference. The study performs

two-sample Wilcoxon rank-sum (Mann-Whitney) test to investigate the sources differences in the stability of Islamic and conventional banks in different crisis periods. In Table 4.6, the results of the two-sample Wilcoxon rank-sum (Mann-Whitney) test reveal statistical significant differences in the p-value at the 1% level between the stability of Islamic banks and Subsidiary Islamic banks after the GFC. The sum of Subsidiary Islamic banks' ranks is higher than the sum of the Islamic banks' after the GFC. Thus, this result suggests that Subsidiary Islamic banks are relatively more stable than Islamic banks, based on the higher rank sum than expected of BSI, after the GFC.

The result also reveals statistical significant difference in the p-value at 5% level between the stability of i) Islamic banks and conventional banks with Islamic subsidiaries, after the GFC and ii) conventional banks and Subsidiary Islamic banks, after the GFC. This suggests that after the GFC, conventional banks with Islamic subsidiaries are relatively more stable than Islamic banks. Similarly, this also suggests that the Subsidiary Islamic banks are relatively more stable than conventional banks after the GFC.

The result of Wilcoxon rank sum also reveal that there is statistical significant in the p-value at 10% level between the stability of Islamic banks and conventional banks. However, based on the rank sum, this result contradict the earlier result as the sum of conventional banks ranks is higher than the sum of the Islamic banks. However, this result is different than the earlier result which is run on general classification of banks and over the sampling period, unlike this on the period after the GFC. Thus, generally Islamic banks may be relatively more stable than conventional banks but conventional banks are relatively more stable or recover faster than Islamic banks during the period after the GFC.

During the other periods, i.e. during local crises, during GFC and before GFC, as the p-value is not statistical significant, this provides no evidence of differences in the stability Islamic banks, conventional banks, Subsidiary Islamic banks and conventional banks with Islamic subsidiaries.

Table 6.
Results of two-sample Wilcoxon rank-sum (Mann-Whitney) test
for the sources of difference (1999 – 2006)

No	Bank model	Local crisis (1999-2001)			Before global crisis (2002-2006)		
		Rank sum	Expected	Z-stat	Rank sum	Expected	Z-stat
1.	Islamic banks / Conventional banks	81 / 4,672	98 / 4,655	0.661	487 / 16,533	462 / 16,557	0.834

No	Bank model	Rank sum	Expected	Z-stat	Rank sum	Expected	Z-stat
2.	Islamic banks / Subsidiary Islamic banks	7 / 21	8 / 20	0.698	48 / 162	52 / 157	0.694
3.	Islamic banks / Conventional bank with Islamic subsidiaries	19 / 134	18 / 135	0.882	69 / 231	62 / 237	0.644
4.	Conventional banks / Conventional bank with Islamic subsidiaries	5,835 / 835	5,800 / 870	0.771	11,547 / 2,988	11,884 / 2,650	0.173
5.	Subsidiary Islamic banks / Conventional bank with Islamic subsidiaries	58 / 152	52 / 157	0.631	286 / 309	262 / 332	0.415
6.	Conventional banks / Subsidiary Islamic banks	4,803 / 247	4,797 / 252	0.931	17,294 / 1,621	17,452 / 1,462	0.448

*significance at 10 **significance at 5 ***significance at 1%

Table 6.
Results of two-sample Wilcoxon rank-sum (Mann-Whitney) test
for the sources of difference (2007 – 2015)

No	Bank model	Global crisis (2007-2009)			After global crisis (2010-2015)		
		Rank sum	Expected	Z-stat	Rank sum	Expected	Z-stat
1.	Islamic banks / Conventional banks	486 / 9,244	490 / 9,240	0.969	1,807 / **76,799**	2,580 / 76,025	**0.057***
2.	Islamic banks / Subsidiary Islamic banks	48 / 57	52 / 52	0.565	143 / **385**	214 / 313	**0.006*****
3.	Islamic banks / Conventional bank with Islamic subsidiaries	83 / 217	87 / 212	0.775	234 / **1,092**	338 / 988	**0.024****

No	Bank model	Rank sum	Expected	Z-stat	Rank sum	Expected	Z-stat
4.	Conventional banks /	18,797	18,879	0.821	71,092	71,064	0.797
		/	/		/	/	
	Conventional bank with Islamic subsidiaries	4,639	4,557		161	189	
5.	Subsidiary Islamic banks /	88	87	0.975	580	551	0.624
		/	/		/	/	
	Conventional bank with Islamic subsidiaries	212	212		1,073	1,102	
6.	Conventional banks /	9,194	9,240	0.658	76,115	77,174	**0.032****
		/	/		/	/	
	Subsidiary Islamic banks	536	490		**4,888**	3,828	

V. CONCLUSION

The study investigates the different between bank stability of Islamic banks, conventional banks, subsidiary Islamic banks and conventional banks with Islamic subsidiaries over different timing period, namely on the whole sampling period (1999-2015), before the period of crisis (1999-2026), during the crisis period (2007-2009) and after the crisis period (2010-2015). The study finds that generally, over the sampling period, the Islamic banks are relatively more stable than conventional banks in Indonesia. The Islamic banks are relatively more stable than the conventional banks before the GFC. However, there is no statistical evidence of the different between the stability of Islamic and conventional banks during local crisis, during the GFC and after the GFC.

There is evidence that the Islamic banks to be relatively more stable than conventional banks in Indonesia, during the sampling period of 1999-2015. The Islamic banks are also better capitalised with better asset quality compared to the conventional banks as noted by Beck, Demirgüç-Kunt, & Merrouche (2013) for a study of conventional and Islamic banks in 20 countries. More generally, the shariah governance which ensure transparency and disclosure of the Islamic banks have proven to be beneficial in ensuring the strength of the Islamic banks. Thus, the characteristics of Islamic banks during these period can be investigated, for future research and applied in order to have a more stable financial system.

As for the other bank models, it seems that there is no evidence of the difference among these models during different periods. The only period that is noticeable is after the GFC where the conventional banks are relatively more stable than the Islamic banks whereas Subsidiary Islamic banks are relatively more stable than the conventional banks and Islamic banks. Similarly, Conventional banks with Islamic subsidiaries are relatively more stable than the Islamic banks. After the GFC, the conventional banks are relatively more stable than the Islamic banks, probably given the relatively bigger size of majority of the conventional banks in Indonesia.

This study draws important practical and policy implications for banking industry. Over a long period of time, the Islamic banks are relatively more stable than the other bank models. However, during the shorter period of time, especially after the GFC, there is a mixed result. Thus, the other bank models should practice prudent and unexcessive risk taking during the longer period of time while the Islamic banks should be more aggressive in recovering from crisis.

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