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Banking Fragility and Financial Crisis: Evidence from Southeast Asia

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Abstract

Throughout the 17 years of study period, the Southeast Asian countries were faced with three forms of financial crises namely Asian financial crisis, subprime crisis and currency crisis. Previous literatures have evidenced that banking fragility has been closely associated with financial crisis. Hence, this paper aims to construct the banking sector fragility index (BSFI) during the different forms of crises. Three Southeast Asian countries were selected based on their common economic fundamentals and top three largest gross domestic product (GDP) per capita i.e. Indonesia, Thailand and Malaysia which were studied from the year 2000 to 2016. The results indicate the Indonesian and Thailand banking sectors were seriously fragile after the Asian financial crisis (1997-1999). However, the fragility of banking sectors for these countries including Malaysia had diminished during the subprime crisis (2008-2009). Worst scenario repeated for the Indonesian banking sector when the currency crisis emerged in early 2014. Similarly, Malaysian banking sector confronted the worst level of fragility for the country following the depreciation of Malaysian ringgit against the US dollar at the end of 2014 to early 2015. This study shows that the three countries' banking sectors have responded differently to the three forms of financial crises.

Keywords: BSFI, Banking fragility and financial crisis, Southeast Asia

1. Introduction

The middle of 1997 was a starting date of the Asian financial crisis. It was a sequence of currency devaluations started in Thailand as the government was unable to keep the currency peg, the Baht to the U.S. dollar (USD). This Baht crash spread vigorously to other nearby countries like Malaysia, Indonesia and Philippines. The situation negatively affected those countries' stock market, import revenues, government control and banking system. Banking system was the most affected during the crisis. The breakdown in interbank markets made the major central banks inject large liquidity capital and pursue tightened monetary stance to minimize the currency disorder. At the same time, the International Monetary Fund (IMF) and World Bank offered monetary supports and conditions to rescue the regional banking system from total downfall. So, Thailand, Indonesia and Philippines adopted the IMF protective measures to ensure their currency stability. The IMF intervention and strict monitoring had slowed the regional economic slump. By year 1999, the countries' currency situation slowly recuperated.

After ten years, the 2008 sub-prime crisis occurred. Asian economies had experienced a secular rise in debt levels relative to their national income. As reported in the BBVA research report (2014), bank loan to GDP ratios had risen most rapidly across Thailand, Singapore and Malaysia. More importantly, most Asian economies faced high credit growth during 2011. This included Vietnam (34%) and Indonesia (30%), while Philippines experienced a late pick up in year 2014 with an average of 32%. Also, the operating environment for Asian banks had become increasingly tougher owing to spikes in global financial market volatility, sharp depreciation in domestic currencies and significant rise in interest rates over the period of 2014-2015 and protracted slowdown in consumption and investment demand.

Banking fragility has been defined as vulnerability to financial crisis that eventually leads to serious breakdown in market functioning such as disruption in financial intermediation, credit crunch or lack of financing for new investments and consumption activities (Allen & Gale, 2000). The financial crises are more likely to occur in less concentrated banking systems due to the absence of powerful providers of financial products that could reap benefits from the high profits (Allen and Gale, 2004).

With regards to this, it is crucial to conduct a study on banking fragility for Southeast Asian countries such as Malaysia, Thailand and Indonesia. Thus far, it was found that no studies have been conducted on the banking sector fragility index (BSFI) in the Southeast Asian region. Therefore, this study aims to develop BSFI for Southeast Asia specifically Malaysia, Thailand and Indonesia. The proposed index will identify the different levels of fragility across the different banking crises that occur in these countries.

The remainder of this paper is organised as follows: Section 2 presents literature review on banking fragility and financial crisis. Section 3 explains the construct of measuring BSFI. Section 4 discusses the level of banking fragility across three countries during the financial crises. Finally, section 5 draws some conclusions and recommendations.

2. Literature Review

The 2008-2009 subprime crises had led to banking crises that resulted in damage and instability of financial institutions such as Lehman Brothers in the United States (U.S.). Kicking off with asset bubble in the U.S., the subprime crisis drove the mortgage crash and ultimately crushed the housing and banking calamity. According to Krugman (2009), the main impact of banking crisis instigated among investment and merchant banks, which was then outspread to commercial banks.

There have been a notable number of studies focused on early warnings of banking crises. Among them are Guarin, Gonzalez, Skandalis and Sanchez (2014), Lozano and Guarin (2014), Degryse, Elahi and Penas (2013), Demirguc-Kunt and Detragiache (1998) and Gonzalez-Hermaosilo and Billings (1997). Nevertheless, there were limited number of studies found on banking crises and financial fragility in Asia Pacific. In this regard, it is vital to conduct a study on banking fragility specifically on Indonesia, Thailand and Malaysia, the Southeast Asian's top three largest economies by GDP per capita for 2018, which were most affected by the financial crisis.

Degryse et al. (2013) stated that a region's banking system characteristics play a significant role in explaining regional banking system fragility. They found that higher liquidity and larger capitalization are among the banking system characteristics that contributed to reduce regional banking system fragility. Seemingly, bank liquidity can be seriously affected by financial crisis as the time when assets are rendered less than their nominal value and causing losses (Choon, Hooi, Murthi, Yi & Shven, 2013). Meanwhile, Vodová (2011 & 2013), and Bunda and Desquilbet (2008) reported a negative correlation between financial crisis and bank liquidity.

Hanggraeni (2018) revealed that more competition could lower bank fragility or instability in the Indonesian banking industry during normal times. However, the competition-fragility connection does not hold during a financial crisis, where she indicated that market power has influenced in minimizing bank fragility during financial crisis. Therefore, she concluded that the effects of competition on bank fragility depend on the economic state. Hanggraeni's finding is consistent with Nguyen and Le (2015) and Fernández and Garza-García (2015), who asserted that escalating bank competition helps to improve the banking system stability in Vietnam and Mexico respectively. Nonetheless, the Vietnam commercial banking system experienced instability and increased NPLs due to rising competition during the financial crisis. Meanwhile, greater bank competition intensified overall bank portfolio risks in Mexico. Nevertheless, the advantages on the overall stability compensated for the growth in bank portfolio risks due to the fairly low amounts of NPLs in the Mexican banking sector.

On the contrary, De-Ramon, Francis and Straughan (2018) remarked that on average, competition reduces stability, but its impact differs across banks depending on their fundamental financial condition. They evidenced that escalating competition motivates financially fragile banks to minimize costs, reduce portfolio risk and expand capital ratios, thus vitalizing their stability through increases in their profitability and capital. On the other hand, competition discourages healthier banks to enhance capital ratios, thus diminishing their stability. They added that competition weakens market power and lowers bank values. This stimulates banks to undertake more risk to boost returns, hence lowering bank stability. Sosa-Padilla (2018) explained that sovereign default (of government debt) contributes to banking crisis. The default does not merely cause depletion in banks' assets value, but also prompt a credit crunch, where banks have to limit their lending to high-yielding private sectors and at a higher financing cost. In the wake of the banking crisis throughout the default period, it consequently results in huge fall in GDP output specifically as in the case of Argentina during 2001-2002.

Rauch (2015) studied stability of the U.S. dual banking system over the period 2005-2008 taking into consideration the 2007-2008 global financial crisis. As measured by the CAMEL score methodology, national banks have diminished their fragility after the surging of the financial crisis as compared to state banks, where national banks rigorously restricted their liquidity creation and amount of loan growth to protect against feasible liquidity crunches and limiting the risk of losses in future. The study remarked that public statements and publicly

available information from the regulatory agencies failed to foresee the full scope of financial crisis in reducing the banks fragility.

Hatipoglu and Peksen (2018) concluded that economic restrictions could contribute to a larger probability of systematic banking crises by worsening the target economies' macroeconomic circumstances and restraining their access to international capital. Their findings also indicated that financial restrictions are more damaging to the stability of banking systems than trade restrictions.

Vives (2018) cautioned the governments and regulators that the growth of shadow banking and unsupervised banking activity could render prevalent impacts on banking instability and systemic risk. The possible implications from the emergence of fintech and bigtech firms such as Amazon and Google must be taken into account notably by the banking system. He suggested that well-designed regulation might relieve the competition-financial stability trade-off that arises due to regulatory deficiency or failure. Gibson, Hall and Tavlas (2018) pointed out banking system vulnerability to external distress, where the greater vulnerability would cause greater impact out of the distress. The banking vulnerability was soaring preceding the eruption of global financial crisis such as the UK, German and France with banks susceptible to highly risky assets. The level of impact was most notably high and varied in Greece, Italy and Spain which had been connected with the euro area sovereign debt crisis since 2008.

Mirzaei (2019) revealed that the financial crisis had adverse impact on 31 UAE banks, where the banks lost significant level of market power during the crisis particularly among less capitalized and less efficient banks. Surprisingly, the banks with large market share also felt the impact of the crisis. He added that financial crisis terribly shrank banks' performance in developed or emerging markets. Meanwhile, Pak (2017) proved that banks' stability in Kazakhstan has worsened since the 2008 global financial crisis due to forceful lending activities and relying heavily on short term large-scale funding. Other factors such as considerable bank size and commitment in securities' investments also contribute to the slumping banks' stability for the periods following the crisis. He suggested that more diverse funding arrangements in short term could have improved the banks' stability besides the essential for equity capitalization in intensifying the Kazakhstani banking system and financial sustainability in long term.

Degl'Innocenti, Grant, Šević and Tzeremes (2018) proposed that the capacity to enhance banks' stability together with financial centres' stability in a highly competitive environment acts as a protective measure against the global financial crisis's negative impacts. Higher stability materializes the improvements in innovation and technological change particularly for large banks. In addition, they noted that the most efficient banking systems are located in Western-Central Europe, Northern Europe and Asia. Anginer, Demirguc-Kunt and Mare (2018) studied the relationship between banks' capital and countries' institutional environment alongside the effects of both factors on the fragility of publicly traded banks in 61 countries. The countries, which render superior public-private supervision and great extent of information availability, recorded lower effect of capital on their banks' fragility. On the contrary, the capital shows larger effect on minimizing the banks' fragility for smaller and less developed countries. This is due to inefficient monitoring on the financial institutions and lower amount of information available to the public in those countries.

3. Data Sources and Mathematical Modelling

The measurement of fragility level in Southeast Asia starts by identifying risk factors associated with banking sector. The risk factors which consist of liquidity, exchange and credit risk are the main components in constructing Banking Sector Fragility Index (BSFI) for Malaysia, Indonesia and Thailand. The sample includes monthly data extracted from individual balance sheet, income statement and ownership structure data reporting in Bankscope Database and website of Central Bank of Malaysia, Indonesia and Thailand. The data commenced from year 2000 to 2016.

Table 1: Construct of BSFI

Economic risks	Proxy	Data source
Liquidity risk (Massive bank runs)	Bank real total deposit (DEP)	1. Bankscope Database 2. Central Bank of Malaysia, Bank of Indonesia and Bank of Thailand websites
Exchange rate risk	Foreign liabilities (FL)	
Credit risk (Rising NPL)	Bank Claims on Private Sector (CPS)	

Table 1 shows the selection of variables used to construct BSFI. Monthly data for DEP, FL and CPS are collected and then BSFI is transformed into annualized term. Kibritcioglu (2003) has developed BSFI on his study of fragility in Mexico. This study replicates the BSFI developed by him with some modification on sample size and study period. BSFI is derived from economic risks, which is associated with banking sectors. The index developed is useful to measure the levels of fragility and risk-taking within Malaysia, Indonesia and Thailand. Table 1 presents the risk components of BSFI. The calculation considered an average of standardize value of annual changes in CPS, DEP and FL, where μ and σ stand for the arithmetic average and standard deviation of these variables respectively. (Refer to Equations 1, 2, 3 and 4).

$$BSFI_t = \frac{\left(\frac{CPS_t - \mu_{cps}}{\sigma_{cps}}\right) + \left(\frac{DEP_t - \mu_{dep}}{\sigma_{dep}}\right) + \left(\frac{FL_t - \mu_{fl}}{\sigma_{fl}}\right)}{3} \quad \text{Equation 1}$$

$$CPS_t = \left[\left(\frac{TCPS_t - TCPS_{t-1}}{TCPS_{t-1}} \right) \right] \quad \text{Equation 2}$$

$$DEP_t = \left[\left(\frac{TDEP_t - TDEP_{t-1}}{TDEP_{t-1}} \right) \right] \quad \text{Equation 3}$$

$$FL_t = \left[\left(\frac{TFL_t - TFL_{t-1}}{TFL_{t-1}} \right) \right] \quad \text{Equation 4}$$

The index introduces the trend of fragility as explained by five different phases. In Figure 1, the trend starts with upward trend in phase I, where the value is above zero and indicates that the situation is free from unfavourable signs. However, the chances of the banking sector being fragile in the long run begin to increase. During phase II, rising panic leads the value drop and consistently decreasing as downward trend is now replacing the upward trend. The value starts to drop below zero during phase III and approaching borderline crisis and medium fragile.

The momentum of the trend continues vulnerable and experience highly fragile with the probability of crisis had occurred during phase IV. Last stage which is phase V represents recovery stage. The crisis is over and the value of index will be very close and equal to zero.

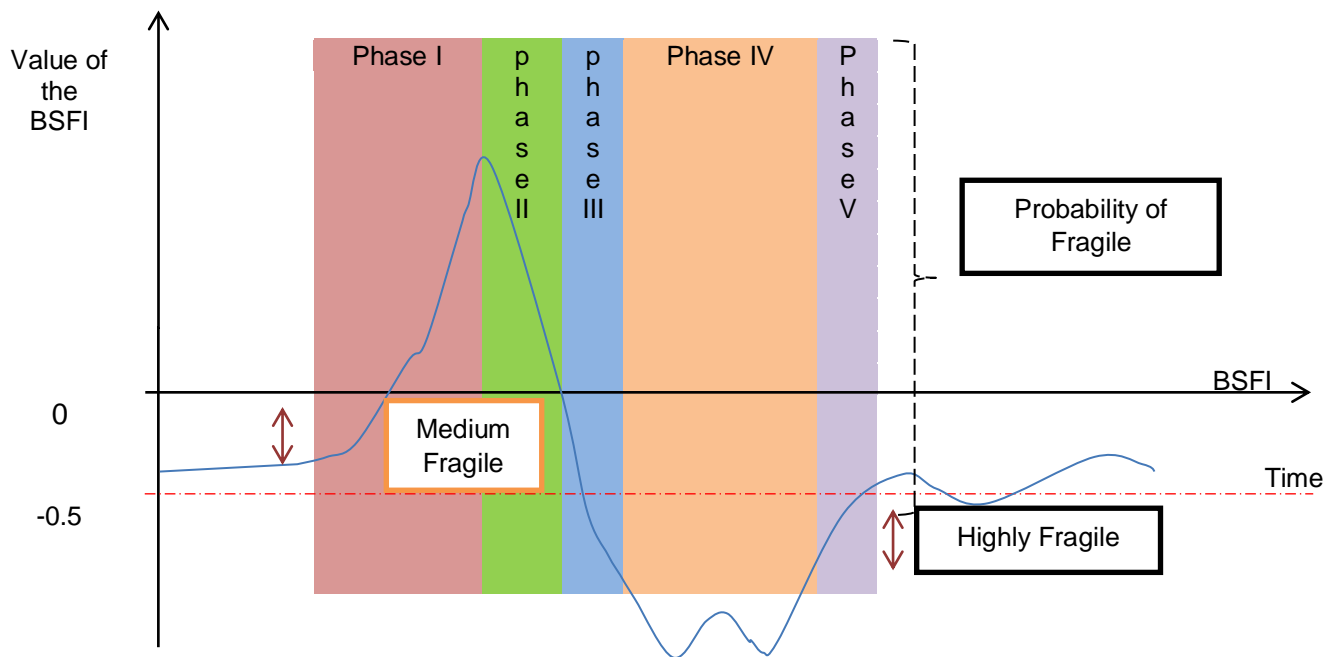


Figure 1: Time Path of the BSFI and Five Phases of a Hypothetical Banking Crisis

Figure 1 illustrates the different levels of fragility based on the value of BSFI. There are five phases of BSFI.

4. Empirical Analysis and Discussion

This section presents the result of banking sector BSFI for Southeast Asia specifically Malaysia, Thailand and Indonesia. The construct of BSFI was adopted from Kibritcioglu (2003) with some modifications. Essentially, the development of BSFI for each country and financial crisis is addressed.

4.1 Measurement of Banking Sector Fragility Index (BSFI)

We start the analysis by calculating BSFI of individual countries (Malaysia, Thailand and Indonesia) for each year. Over the period from 2000 to 2016, there were three major financial crises namely Asian financial crisis (early 2000), global financial or subprime crisis (2008 -2009) and currency crisis (2014-2015). Apparently, the impact of Asian crisis (1997 - 1999) to the banking sector of these countries was really bad when BSFI was the highest in 2001 with -3.82 and -3.42 for Indonesia and Thailand respectively (Figure 2). During this Asian crisis, Thailand government became unable to maintain its currency peg to dollar. This scenario spread to Indonesia as well as South Korea. Eventually, it forced some of the affected governments to construct social protection policies. For instance, Indonesia and Thailand were rescued by International Monetary Fund (IMF) with conditions attached.

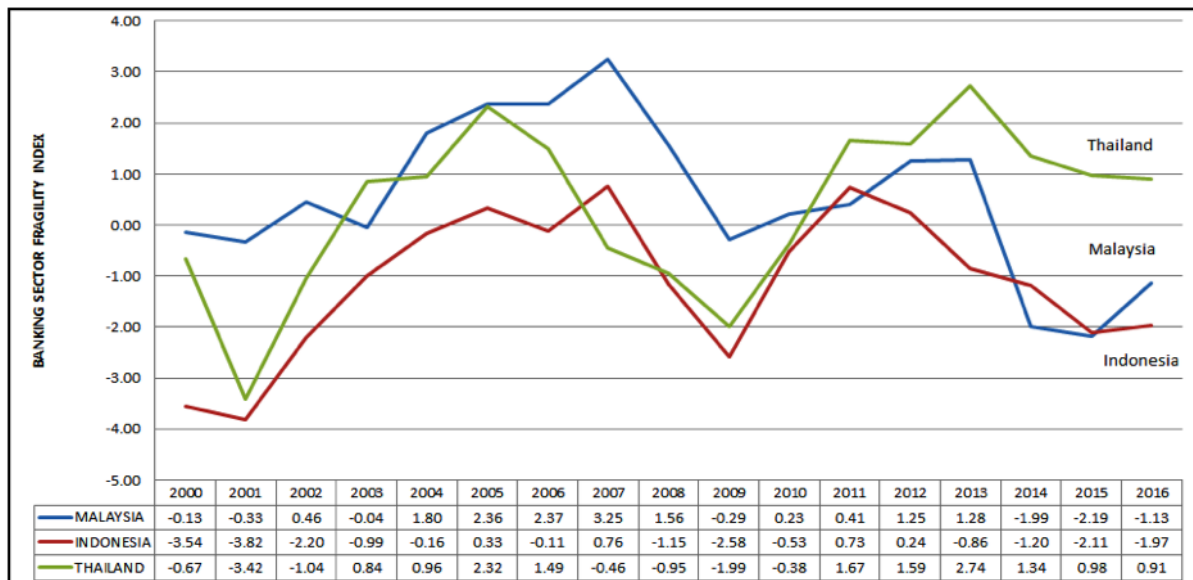


Figure 2: Banking Sector Fragility Index (BSFI) for Malaysia, Indonesia and Thailand

Surprisingly, the subprime crisis did not much affected as compared to Asian crisis for Southeast Asia. Figure 2 shows that subprime crisis was associated with higher BSFI of -2.58 and -1.99 for Indonesia and Thailand respectively in year 2009. As for Malaysia, the banking sector was moderate and less fragile to subprime crisis when the BSFI was -0.29. It reveals that banking fragility of these countries was less connected to subprime crisis that occurred in early 2008. A consequence for economy was a deterioration of exports to developed countries during 2008-2009 and these Southeast Asia experienced a fall in real gross domestic product (Rasiha, Cheong & Doner, 2014).

Unfortunately, the appreciation of US dollar which started in early 2014 caused currency crisis for Asia particularly in Malaysia and Indonesia. Clearly, Malaysia achieved the BSFI of -1.99 while Indonesia -1.20 in year 2014. In addition, the issue of currency crisis pushed the BSFI to be -2.19 and -2.11 in Malaysia and Indonesia respectively for year 2015. In contrast, Thailand was not affected by currency crisis when the BSFI was positive and stable for the last three years. Our findings are consistent with Degryse, Elahi and Penas (2013) and Frankel and Rose (1996).

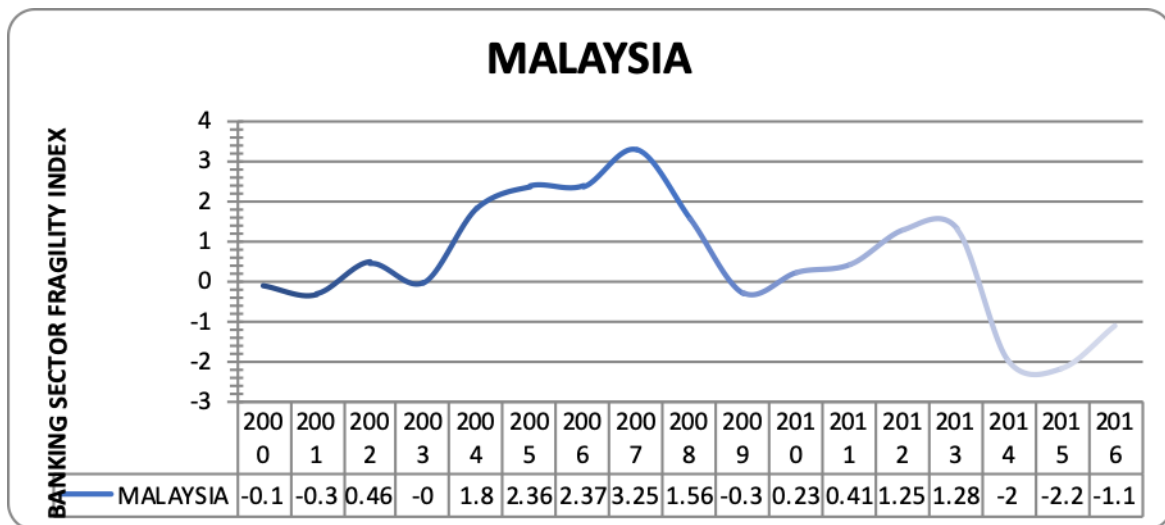


Figure 3: Banking Sector Fragility Index (BSFI) for Malaysia

Referring to Figure 3, the Malaysian banking sector was loosely fragile following the Asian financial crisis with the BSFI recorded at -0.13 and -0.33 in early 2000. A recovery stage began in year 2002 with BSFI of 0.457 but experienced a slight fragile in 2003. Subsequently, the banking fragility had significantly improved for the next four years with the BSFI ranged from 1.7982 to 1.561 in year 2004 and 2008 respectively. This scenario happened because Malaysian government has used monetary and fiscal policies to stimulate economic recovery and the sector's willingness to take excessive risk.

In addition, the subprime crisis in late 2007 had led the BSFI to deteriorate. Based on Figure 3, the BSFI dropped from 3.25 to 1.561 in year 2008. Southeast Asia market economies were victim of this global crisis that began in 2008 (Rasiha et al., 2014). A negative scenario with a drop of the BSFI had continued until 2009 before it showed a marginal positive trend between 2009 and 2013. In the late of 2013, a second wave of banking fragility occurred in Malaysia in the wake of currency crisis. It reveals that the BSFI increased from -1.99 to -2.19 over the period from 2014 to 2015. Eventually, the BSFI improved to -1.13 in year 2016. Tremendous exchange rate depreciation against the US dollar had affected Malaysian banking fragility. This disruptive scenario is referred to currency crash as stated by Frankel and Saravelos (2012) who found real exchange over valuation to be leading indicators of subprime crisis. The fact is Malaysian banking fragility was mostly connected to currency crisis.

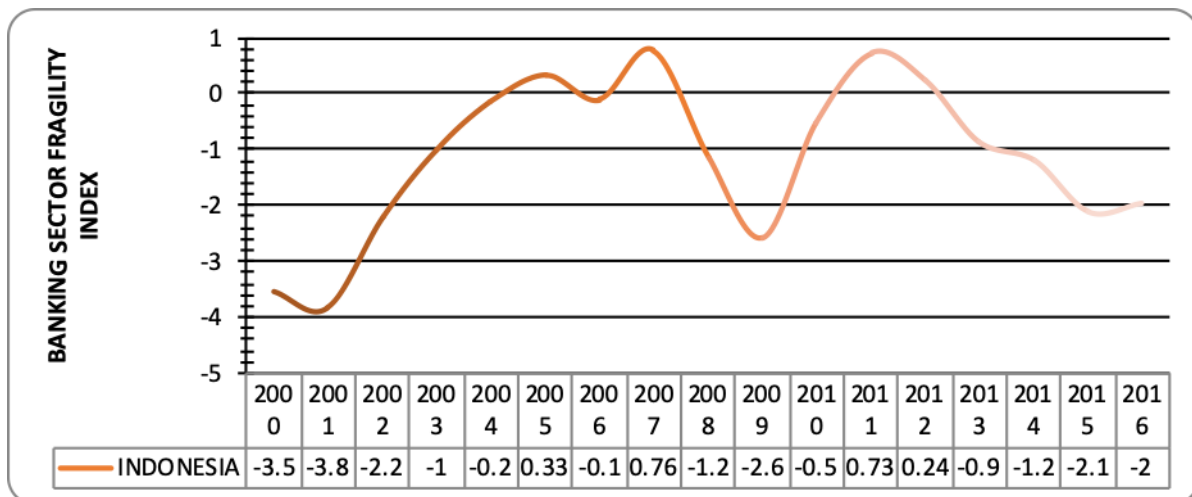


Figure 4: Banking Sector Fragility Index (BSFI) for Indonesia

Figure 4 illustrates the movement of BSFI in Indonesia. The graph shows the BSFI was highly volatile and peaked in 2001, 2009 and 2015. The Indonesian banking sector was seriously affected by Asian financial crisis, where the BSFI was reported to be -3.5 and -3.8 in early 2001. This was because Indonesia was faced with massive exposure to debt service problems. The Southeast Asian economies suffered a critical debt service problem with high non-performing loans (NPLs) of Indonesian banking sector at 48.6%. From 2001 onwards, the banking sector became better and less fragile until 2004. During this period, the BSFI was within a range of -2.2 to -0.2. In 2005, the banking sector improved and it was classified as not fragile before slightly becoming fragile in 2006 and recovering in 2007.

The country's banking sector was again severely crashed by subprime crisis over the period of 2008 and 2009, which the BSFI had fallen from -1.15 to -2.58. In early 2010, the situation began to recover and indicated uptrend until end of 2011. Nevertheless, the banking fragility had just moderated for a short period before it stumbled for a few years repeatedly. The Indonesian banking sector was also affected by currency crisis as the BSFI pullback downward in 2013. Figure 4 reveals the BSFI had increased from -0.86 to -2.11 in the years 2013 to 2015. Still, the BSFI was reported continuously to show the sign of fragility until 2016. In summary, Indonesian banking fragility was relevant in three financial crises happened during the sample period.

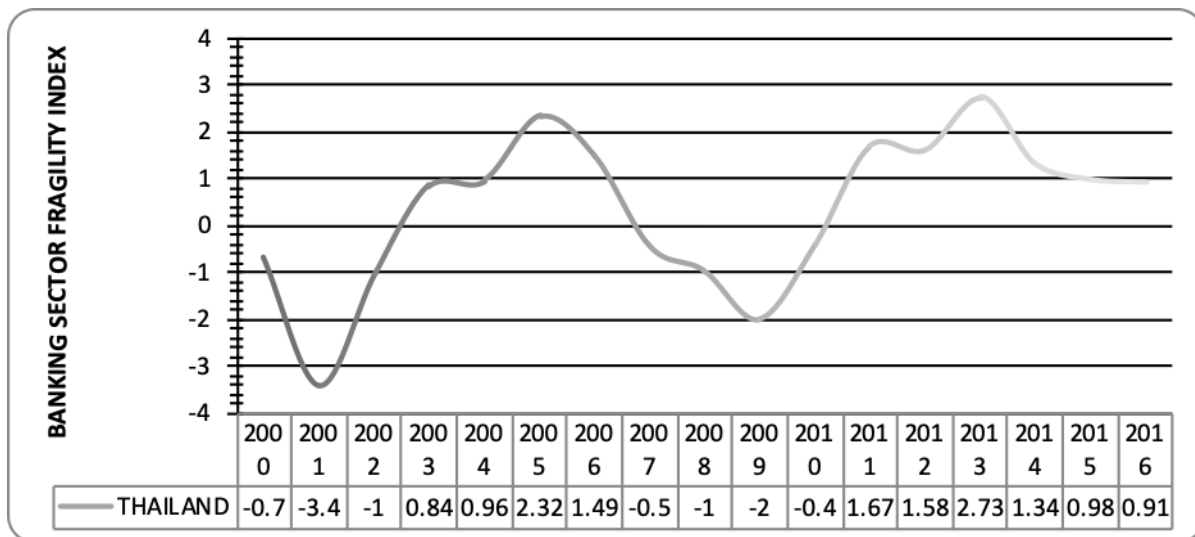


Figure 5: Banking Sector Fragility Index (BSFI) for Thailand

Figure 5 shows the trend of BSFI in Thailand. The BSFI was at the highest level in 2001 and 2009. Similarly, Thailand had been disrupted by Asian financial crisis. Figure 5 illustrates the BSFI had continued to increase from -0.67 to -3.42 in the years 2000 to 2001. This indicates the banking sector in Thailand seemed to be in the stage of high risk as the BSFI continued to increase. While, starting in 2002, the direction of the BSFI was augmented significantly above zero and improved from 0.844 in 2003 to 2.324 in 2005 as depicted in Figure 5. However, the BSFI dropped badly from 1.492 in 2006 to -1.99 in 2009. This reveals that banking fragility was associated with subprime contagion that hit US in late 2007. Thailand banking sector was considered as taking excessive risk during Asian financial crisis as compared to subprime crisis.

On the contrary, the Thailand banking sector performed better and less fragile in 2010 as the BSFI was only -0.38. It appeared that BSFI had been augmented to 2.7361 in 2013. Improvements in banking fragility had started from 2011 onwards as its BSFI shows positive value. Surprisingly, Thailand was one of the Southeast Asian countries that was not seriously affected by currency crisis in late 2013. The resilience of the Thailand banking sector continued until 2016 though the BSFI that showed a downward trend from 1.34 in 2014 to 0.913 in 2016. Apparently, Thailand banking fragility was only connected to Asian financial crisis as well as subprime crisis.

5. Conclusions

The three Southeast Asian countries had been affected by the financial crises for the past 16 years. This study aims to evaluate the level of banking fragility by constructing banking sector fragility index (BSFI) of these Southeast Asian countries. The construct of BSFI is similar to Kibritcioglu (2003) but with some modifications. This BSFI could assist the banking sectors to prepare for the cycle of fragility. The findings found that all the banking sectors in Malaysia, Indonesia and Thailand were found to be fragile in the early 2000s due to the impact of Asian financial crisis. During subprime crisis, the fragility of Malaysian banking sector had lessened as compared to Thailand and Indonesia. The emergence of currency crisis was associated to the banking fragility of Malaysia and Indonesia. Essentially, currency crisis and Asian financial crisis had influenced the banking fragility in Southeast Asia. The banking sectors must come up with contingency plans and effective strategies in confronting unpredictable financial crisis or otherwise they have to face consequence of fragility that adversely affects overall financial performance. The government must come up with effective

monetary and fiscal policies that could boost and strengthen the country's banking sector. Further research could be undertaken involving other emerging economies from other parts of the world to gauge full scenario of banking sectors' fragility.

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