

Deposit Insurance, Crisis, and Risk Taking in ASEAN Banks

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ABSTRACT

This study tests the role of deposit insurance on banks' risk-taking behaviour and systemic risk in five ASEAN countries during the 2007-2008 crisis period. After controlling banks' specific and macroeconomic factors, this study reveals that the presence of such a guarantee significantly reduces banks' risk-taking and banks' systemic risk in the region. The study also uncovers the negative effect of crisis on banking stability; it appears that when the guarantee is applied during the crisis period, it reduces banks' systemic risk. The findings of this study are consistent with the objective of implementing a deposit insurance system in banks as a means to avoid bank runs and to protect banks from systemic risk, especially during economic downturns. Such a policy can help to decrease bank risk whilst increasing bank stability.

Keywords: Deposit insurance; Bank risk taking; banking stability; ASEAN-5

JEL Classification: G21, G28.

INTRODUCTION

Good quality institutions and strong support from regulators, according to Enkhbold and Otganshar (2013) can enhance the effectiveness of the deposit insurance system and improve banks' risk taking behaviors. The deposit insurance system is believed to have an important role in reducing the effects of financial crisis such that it avoids bank runs and protects the banking industry from systemic risk (Morrison & White, 2011). Furthermore, the implementation of a deposit insurance system can increase the level of customer confidence whilst reducing the possibility of bank runs in crisis periods (Anginer *et al.*, 2014). Nonetheless, the study conducted by Caprio and Honohan (2004) found different results where the level of market

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discipline actually turns out to be low or even non-existent. In another study, Demirguc-Kunt and Huizinga (2004) observed that an explicit deposit insurance system weakens market discipline, thus lowering bank risk-taking. Another study performed by Forssbaeck, (2011) noted that the increase in risk-taking caused by such implementations was motivated by the presence of moral hazards. This condition is usually interpreted by banks as the reason to escalate risk so as to improve profitability.

The application of the deposit insurance system in a national bank has been established since 1934 by the US. Following the success of such guarantees, the system was then adopted by most OECD countries in the 1980's. The regulation was subsequently adopted by some ASEAN countries except for Thailand which implemented the system in 2011 whereas the Philippines adopted it since 1963. In 2004, Basel 2 in the 3rd pillar was published as a means to improve the standard requirement of bank capitals in managing banks' exposure to risk, to improve banking stability (Cubillas *et al.*, 2012), and to implement a blanket guarantee scheme. However, despite its popularity, the role of the deposit insurance in a crisis period is still being questioned, taking into account the controversy observed in the empirical evidences of some banking systems. For example, Hadad *et al.* (2011) found that the implementation of the guarantee weakened the level of market discipline in Indonesia. In their study, Demirguc-Kunt and Detragiache (2002) noted that the presence of the deposit insurance could lead to more frequent bank failures and systemic risk.

To reduce the impact of systemic risks due to bank failures, central banks have introduced a deposit insurance system to encourage financial stability and payment systems (Cull *et al.*, 2002). This outcome was noted by Gropp and Vesala (2004) who revealed that the deposit insurance system played an important role in improving bank stability which is accomplished by eliminating the problem of depositor panic and controlling the opposite effect on market discipline. The US was the first country to introduce a national system of deposit insurance run by the Federal Deposit Insurance Corporation (FDIC). Its aim was to increase trust in banks' liquidity (Golembe, 1960). In ASEAN countries such as Indonesia, Malaysia, and Thailand, the deposit insurance system implicitly applied a blanket guarantee or full guarantee in response to the Asian crisis that occurred in 1997/1998. This guarantee was explicitly stated in 2005 in Indonesia, Malaysia, and Singapore, and in 2011 in Thailand. Meanwhile, in the Philippines, the system has been implemented explicitly since 1963. The most notable difference seen in the implementation of the deposit insurance system in each country is the regulation for a bank's premium payment. For example, in Indonesia, it is based on the amount of deposits held, whereas in Malaysia and Singapore, it depends on the risk profile of each bank.

However, Demirguc-Kunt and Detragiache (2002) argued that the existence of the deposit insurance system would increase the negative impact of crisis by weakening the level of market discipline; it would also attract a higher risk taking behaviour by banks. This view was contended by Angkinand and Wihlborg (2008) who claimed that the level of discipline is weak only when there is a greater possibility of the government being forced to issue a blanket guarantee to help banks out of trouble through a bail out. They claimed that the existence of a deposit insurance system will encourage banks to take higher risks which may result in moral hazards although increased risk-taking is described as a response to deposit insurance acting as an incentive to achieve higher profits (Kane & Demirguc-Kunt 2001).

Previous studies have documented inconclusive evidences when studying the implementation of the deposit insurance system. Some studies found such implementation to increase financial stability (Gropp & Vesala (2004) and Karel & McClatchey (1999) while others (Martinez-Peria & Schmukker, 2014) found such implementation to increase market discipline. Previous studies also found negative impacts of the implementation on market discipline, which showed increase risk (see Demirguc-Kunt & Detragiache, 2002; Angkinand & Wihlborg, 2008; Martinez-Peria & Schmukker, 2014). Keeley (1990) and Chernykh and Cole (2011) noted that deposit insurance implementation increases moral hazard which leads to the escalation of bank risk taking behaviours.

Other scholars (Enkhbold & Otgonshar, 2013) found that the deposit insurance implementation can lessen the effect of global financial crisis by strengthening depositors' confidence. Subsequently, it would protect banks from the risk of experiencing massive withdrawals or bank runs.

Due to the importance of the deposit insurance system and the inconclusive evidence drawn from various implementations, this study aims to investigate the effect of the implementation of the deposit insurance system on bank risk-taking behaviours in the ASEAN-5 banking markets. This study documents important findings which can show that implementing a deposit insurance system reduces the level of bank risk-taking behaviours and increases banking stability in the crisis years. Furthermore, this study reveals that the implementation of the deposit insurance system reveals the negative impact of the crisis on the stability of banks in the region. However, when the implementation is applied during the crisis period, it reduces banks' systemic risk. This finding is consistent with the objective of the implementation of the deposit insurance system, i.e. to avoid bank runs and to protect banks from systemic risks, especially during an economic downturn. This is because such crisis has different effects on different banking markets in different countries.

The remainder of this paper is organized as follows. Section 2 presents a brief description of related literature reviews on deposit insurance and risk taking behaviours. Section 3 describes the data and methodology used in the study. Section 4 displays the analysis of the results and Section 5 serves as conclusion to the paper.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Bank risk-taking behavior plays an important role in economy and it can affect a country's economic and financial stability. This is especially true in a bank-based economy where the risk-taking behaviors of individual banks can contribute to systemic risks (Laeven & Levine, 2008). In their study, Anginer *et al.*, (2014) found that the level of a systemic stability in 96 countries had increased during the global crisis of 2008. This phenomenon is consistent with the results reported by Boyd and Nicolo (2005) where excessive banking competition might lead to undesirable behaviors that would lead to bank failures, bank runs, and panic.

A deposit insurance system is expected to reduce the likelihood of bank runs during the financial crisis. As such, a deposit insurance system can be used as an effective financial tool by the government to ensure the safety and health of the financial system and to protect

customers from losses due to bank bankruptcy during the global financial crisis. In addition, it can improve customer confidence in the banking industry (Enkhbold & Otgongshar, 2013). However, as suggested by Keeley (1990), a deposit insurance system might also create moral hazard since banks might take excessive risks, as has been noted by Boyle *et al.* (2015) who found that the risk of withdrawal was higher in a country with a deposit insurance system.

Previous studies also suggested that banks' bankruptcy risk may be driven by low capitalization, low income, the provision of excessive loans or credit, and also high rates of credit default (see for example, Meyer & Pfifer, 1970; Martin, 1977; Espahbodi, 1991; Thomson, 1991, 1992; Cole & 1995; Cole & Gunther, 1995; Kolari *et al.*, 2002, Imbierowicz & Rauch, 2014). Therefore, the overall risks should be managed properly so as to ensure that banks can minimize risks that can lead to bankruptcy. Moreover, bankruptcy risk can be systematic or systemic (Fiordelisi & Marques-Ibanez, 2013). In the period of a crisis, the contribution of each bank to the possibility of global banking failure can only be explained by country-specific characteristics of the system and deposit insurance schemes (Weiβ *et al.*, 2014). Studies (Weiβ *et al.*, 2014) have also found that bank size, leverage, and asset risk were significant elements of a systemic risk.

Other studies looking at bank risk taking behavior suggested that capitalization, profitability and non-traditional activities may influence the bank's behavior towards risk (Laeven & Levine, 2009; Demirgic Kunt *et al.* 2008) but it was noted by Hakenes (2011) that size can significantly affect a bank's risk taking behavior. Likewise, Barrel *et al.*, (2008) also discovered that government policies, macro-economic conditions, market disciplines, and the supervisory power of regulators could be factors influencing the risk-taking behavior of banks. In addition, a study of bank efficiency and risk by Laeven (1999) in East Asian countries noted that banks that experienced high risk-taking behavior were generally characterized by those with excessive loans given to real estate sectors, weak government supervision, and a highly concentrated market.

Learning from the effect of global financial crisis on banking stability, governments should explore their roles in providing protection for depositors due to bank failures. Consistent with the theory, the stabilization effect of deposit insurance in the occurrence of contagious bank runs is revealed by Gropp and Vesala (2004) and Karels and McClatchey (1999). They found that protection provided by the government through the deposit insurance system lessened bank risk in the European Union and increased the stabilization of credit union in the USA. However, the guarantee also comes with a liability cost such as moral hazard. For example, Chernykh and Cole (2011) found strong evidence of the emergence of moral hazard along with the implementation of the deposit insurance system. They revealed that implementing a deposit insurance system increases bank risk-taking, i.e financial and operational risks. A study by Imai (2006) revealed that such implementation provided an opportunity for banks to increase leverage and the risk-taking behaviours of each bank. Therefore, our first hypothesis for this study is as follows:

Hypothesis 1a: Deposit insurance implementation increases bank risk taking.

As found by Martinez-Peria and Schmukler (2001), crisis would reduce bank risk taking due to an increment in market discipline.

The second hypothesis is:

Hypothesis 1b: Crisis decreases bank risk-taking.

In previous literature, Anginer *et al.*, (2014) noted that the deposit insurance system had a different effect on bank risk-taking under normal conditions or in crisis conditions. For example, the implementation of the deposit insurance policy in pre-crisis period increased risk-taking while applying it in crisis period reduced the effect. Therefore, the third hypothesis formulated is:

Hypothesis 1c: The implementation of deposit insurance system during the crisis period will reduce bank risk taking.

As suggested by Demirguc-Kunt, *et al.*, (2005), to ensure banking system stability and customer protection from huge losses, as a result of bank failures, the government i.e the central bank, applied the deposit insurance system. This finding is consistent with the objective of implementing such a system which is to reduce the systemic risk of bank failures and to maintain the stability of the payment and the financial system (Cull *et al.*, 2002). Therefore, this study also aims to examine the effect of crisis on banking stability and the impact of deposit insurance implementation during the crisis period on systemic risk by testing the following hypothesis:

Hypothesis 2a: Deposit insurance implementation reduces systemic risk.

Model 2 examines the effect of the crisis period as well as the implementation of the deposit insurance during the crisis on banking stability in ASEAN banks. Using the same independent variables as in model 1, model 2 uses the residual of single index model to limit the effect of high volatility of stock return (see: Soedarmono, *et al.*, 2015; Bautista *et al.*, 2008) as dependent variables to represent bank's systemic risk. According to Anginer *et al.*, (2014), depositor confidence increases due to deposit insurance implementation, thus the implementation provides a stabilization effect during the crisis period. Therefore, the next hypothesis developed is:

Hypothesis 2b: Crisis reduces systemic risk.

As the theory suggests, the implementation of a deposit insurance system can attract customers' confidence and prevent systemic bank runs during a crisis period, thereby leading to lower risk-taking and improving banking stability. In that regard, the next hypothesis is:

Hypothesis 2c: The implementation of deposit insurance system during the crisis period will reduce systemic risk.

DATA AND METHODOLOGY

The analysis of this study employs the annual data of 48 publicly listed banks in five ASEAN countries covering the observation period from 2004 to 2012. Following Fortin *et al.*, (2010) and Brunnermeier (2009), the period between 2007-2008 was considered a financial crisis year. The data of deposit insurance implementation were obtained from the official website of each respective deposit insurance institutions of each country, i.e: The Deposit Insurance Agency of Indonesia, The Deposit Insurance Corporation of Malaysia, The Singapore Deposit Insurance Corporation, The Deposit Protection Agency of Thailand, and The Philippines

Deposit Insurance Corporation. In addition, specific characteristics of individual banks as well as their macro-economic environments were taken at t-1 to avoid problems of causality (Anginer *et al.*, 2014) while the data of banks' specific characteristics were retrieved from Thomson Reuters Eikon and the World Bank for macro-economic variables.

Model Specification

Deposit insurance, when used, is believed to be able to reduce bank runs since it protects the depositors. However, such guarantees may also generate moral hazards to take superfluous risks due to the increase in deposits. In order to investigate the impact of the deposit insurance implementation on bank risk taking, we developed econometric models to test the hypotheses previously developed.

We used dummy variables to represent the implementation of a deposit insurance system. The value is 1 if the deposit insurance applies and 0 otherwise. The log z-score was used to measure bank risk taking behavior as proxy for insolvency risk to accommodate the regulatory concern of bank failures (see, Anginer *et al.*, 2014 and Boyd *et al.*, 2006). Following Boyd *et al.* (2006), the z-score value in this study applied the 3-year rolling-window. Bank control variables are also introduced. As suggested by the theory that due to moral hazard problem, larger banks are riskier than small banks (De Jonghe, 2010; Uhde & Heimeshoff, 2009; and Boyd & Runkle, 1993). In contrast, De Haan and Poghosyan (2011) found that bank size lowered return volatility of the US banks in the 2004Q1-2009Q4 period.

In addition, we also consider the return on assets (ROA) as proxy for bank's profitability. As suggested by Behr, *et al.* (2010), banks with higher profits are more likely to have higher franchise values that boosts risk-taking behaviors. We also took into account the effect of loan loss provision (PROV) as a control variable. Following other studies, provision for loss was measured as a ratio to net income. While we considered bank capitals as proxy for risk; a variable representing the GDP growth rate was used to control country fixed effects. In addition, country dummy variables were used to examine the influence of each country on risk taking behaviors of ASEAN banks.

We estimated model 1a to examine hypothesis 1a on the positive relationship between deposit insurance implementation and bank risk-taking as follows:

Model 1a:

$$\log Zscore_{ijt} = \beta_0 + \beta_1 * di_{dummy_{ijt}} + \beta_2 bsize_{ijt-1} + \beta_3 roa_{ijt-1} + \beta_4 prov_{ijt-1} + \beta_5 Capital_{ijt-1} + \beta_6 g \frac{private}{GDP}_{jt-1} + \beta_7 gdpgr_{jt-1} + \beta_8 countrydummy_{ijt} + \varepsilon_{ijt} \quad (1)$$

Anginer *et al.*, (2014) suggested that the deposit insurance system had a different effect on bank risk-taking under normal or crisis conditions. For example, the implementation of deposit insurance policy in pre-crisis period increased risk-taking, while applying it in crisis period helps to reduce risk-taking. In order to test the effect of the deposit insurance implementation on risk taking during the crisis period in ASEAN banking markets, we developed the following model:

Model 1b:

$$\begin{aligned} \log Zscore_{ijt} = & \beta_0 + \beta_1 * di_{dummy_{ijt}} + \beta_2 * bsize_{ijt-1} + \beta_3 * roa_{ijt-1} + \beta_4 * prov_{ijt-1} + \beta_5 * Capital_{ijt-1} \\ & + \beta_6 * g \frac{\text{private}}{\text{GDP}}_{jt-1} + \beta_7 * gdpgr_{grjt-1} + \beta_8 * countrydummy_{ijt} + \beta_9 * crisisdummy \\ & + \varepsilon_{ijt} \end{aligned} \quad (2)$$

To investigate the effect of the deposit insurance implementation during the crisis period on bank risk-taking behaviours, we included the proposed model as an independent variable which interacts with the deposit insurance and the crisis dummy. The model developed is as follows:

Model 1c:

$$\begin{aligned} \log Zscore_{ijt} = & \beta_0 - \beta_1 * di_{dummy_{ijt}} + \beta_2 * bsize_{ijt-1} + \beta_3 * roa_{ijt-1} + \beta_4 * prov_{ijt-1} + \beta_5 * Capital_{ijt-1} \\ & + \beta_6 * g \frac{\text{private}}{\text{GDP}}_{jt-1} + \beta_7 * gdpgr_{jt-1} + \beta_8 * countrydummy_{ijt} + \beta_9 * crisisdummy \\ & - \beta_{10} * di_{dummy_{ijt}} * crisisdummy + \varepsilon_{ijt} \end{aligned} \quad (3)$$

To examine the negative relationship between deposit insurance implementation and systemic risk, we developed the following model :

Model 2a:

$$\begin{aligned} SystemicRisk_{ijt} = & \beta_0 - \beta_1 * di_{dummy_{ijt}} + \beta_2 * bsize_{ijt-1} + \beta_3 * roa_{ijt-1} + \beta_4 * prov_{ijt-1} + \beta_5 * Capital_{ijt-1} \\ & + \beta_6 * g \frac{\text{private}}{\text{GDP}}_{jt-1} + \beta_7 * gdpgr_{jt-1} + \beta_8 * countrydummy_{ijt} + \varepsilon_{ijt} \end{aligned} \quad (4)$$

To test the positive relationship between crisis and systemic risk, we developed model 2b as follows:

Model 2b:

$$\begin{aligned} SystemicRisk_{ijt} = & \beta_0 + \beta_1 * di_{dummy_{ijt}} + \beta_2 * bsize_{ijt-1} + \beta_3 * roa_{ijt-1} + \beta_4 * prov_{ijt-1} + \beta_5 * Capital_{ijt-1} \\ & + \beta_6 * g \frac{\text{private}}{\text{GDP}}_{jt-1} + \beta_7 * gdpgr_{jt-1} + \beta_8 * countrydummy_{ijt} + \beta_9 * crisisdummy \\ & + \varepsilon_{ijt} \end{aligned} \quad (5)$$

The negative relation between the deposit insurance implementation during the crisis period and systemic risk is modelled as follows:

Model 2c:

$$\begin{aligned} SystemicRisk_{ijt} = & \beta_0 + \beta_1 * di_{dummy_{ijt}} + \beta_2 * bsize_{ijt-1} + \beta_3 * roa_{ijt-1} + \beta_4 * prov_{ijt-1} + \beta_5 * Capital_{ijt-1} \\ & + \beta_6 * g \frac{\text{private}}{\text{GDP}}_{jt-1} + \beta_7 * gdpgr_{jt-1} + \beta_8 * countrydummy_{ijt} + \beta_9 * crisisdummy \\ & + \beta_{10} * di_{dummy_{ijt}} * crisisdummy + \varepsilon_{ijt} \end{aligned} \quad (6)$$

Table 1 presents the descriptions of variables used in this study. The Table presents the definition of the variables, the formulas, and sources of the citations.

Table 1. Variable Summary

Variable	Definition	Formula	Reference
ZSCORE	Risk taking	$\text{Ln}(\text{z-score})$ $= \ln\left(\frac{\text{Avrg } ROA_{i,j,t} + \text{Avrg } TE/TA_{i,j}}{\sigma ROA_t^i}\right)$	Anginer <i>et al.</i> , 2014 Boyd <i>et al.</i> , 2006
Systemic Risk	Residual of Single Index Model	$R_{i,c,t} = MKT_{i,t} * R_{M_{c,t}} + IND_{i,t} * R_{L_{c,t}} + \mu_{i,t}$	Soedarmono, <i>et al.</i> , 2015; Bautista <i>et al.</i> , 2008)
BSIZE	Bank Size	$\text{Bank Size}_{i,j,t-1} = \ln \text{Asset}_{i,j,t-1}$	Anginer <i>et al.</i> , 2014
PROV	Provisions	$\text{Provisions}_{i,j,t-1}$ $= \frac{\text{Loan Loss Provision}_{i,j,t-1}}{\text{Net Interest Income}_{i,j,t-1}}$	Anginer <i>et al.</i> , 2014
ROA	Return on Asset	$ROA_{i,j,t-1} = \frac{\text{Net Income}_{i,j,t-1}}{\text{Total Asset}_{i,j,t-1}}$	Anginer <i>et al.</i> , 2014
Capital	Risk	Equity/Total Assets	Konishi and Yasuda, 2004
GDPGRVOL	GDP Growth Volatility	$\text{GDP Growth Volatility}_{j,t-1} = \sigma \text{GDP growth}_{t-1}^j$	Anginer <i>et al.</i> , 2014
PRIVATECRGDP	Private Credit per GDP	$\text{Private Credit to GDP}_{j,t-1} = \frac{\text{Domestic Credit to Private Sector}_{j,t-1}}{\text{GDP}_{j,t-1}}$	Anginer <i>et al.</i> , 2014
DIDUMMY	Deposit Insurance	1=There is an implementation of Deposit Insurance 0=There isn't an implementation of Deposit Insurance	Anginer <i>et al.</i> , 2014
CRISIS_DUMMY	Crisis	1 = crisis period (2007-2008) 0 = non-crisis period	Fortin, <i>et al.</i> , 2010; Brunnermeir, 2009
Country dummy	Country Dummy	1 = Indonesia 0 = Others	

RESULTS

Table 2 provides the summary statistics of the variables used in this study. As stated earlier, the sample for this study consists of 48 banks in 5 ASEAN countries over the period between 2004-2012. The figures show that the average log z-score of banks in the ASEAN-5 is 3.7. This score is higher than that of Aigner, Demirguc-Kunt, and Zu (2014), where the study found a mean value of 3.5 in 96 countries. This occurrence implies that banks in ASEAN-5 prefer lower risk. This condition may have occurred because these banks were located mostly in developing countries which were also bank-based countries. Therefore, the banks survived by keeping a lower level of risk. In addition, the average level of systemic risk noted of banks in ASEAN-5

is 0.664 which is much higher than the value of 0.04 found by Fiordelisi and Marques-Ibanez (2013) in 14 European banking markets. The finding of the current study thus indicates that banks in ASEAN-5 face a higher systemic risk.

Table 2 Summary Statistics

	Observation	Mean	Max	Min	Standard Deviation
Log(Z-score)	432	3.7046	6.6110	-1.5822	1.0943
Systemic Risk	432	0.5592	1.7799	-1.1045	0.6369
Bank Size	432	6.9023	8.4197	4.7352	0.7247
Provisions	432	0.1891	1.9485	-0.9617	0.2445
ROA	432	0.0115	0.0491	-0.0702	0.0102
Capital	432	0.0964	0.2516	-0.0601	0.0347
GDP Growth	432	0.0519	0.1524	-0.0233	0.0234
GDP Growth Volatility	432	0.0172	0.0854	0.0014	0.0173
Log Population	432	18.1566	19.3244	15.2301	1.0814
Private Credit to GDP	432	0.6429	1.4826	0.2461	0.4125
Trade to GDP	432	0.0674	0.3083	-0.0560	0.0940

Regression Results

Regression analysis was also conducted for this study by using generalized least square (GLS) estimation with random effect models. Table 3 presents the results extracted from the estimation of Models 1a, 1b, and 1c respectively.

The results of the estimation of Model 1a reveal that deposit insurance in the form of government blanket guarantee significantly reduces bank risk-taking in all models. This finding is consistent with the objective of implementing the deposit insurance system so as to avoid bank runs and to protect banks from systemic risks (Morrison & White, 2011). Similar results were found by Anginer *et al.*, (2014), Enkhbold and Otganshar (2013), and Gropp and Vesala (2004). Furthermore, when we include the effect of financial crisis into Model (1b), we did not find any significant effect although the effect increased bank risk-taking. This occurrence indicates that a crisis did not hold back the banks from taking riskier loans. This is possibly because depositors were guaranteed by the deposit insurance system.

An interesting result was revealed when we examined the effect of the deposit insurance implementation during crisis periods on bank risk-taking (Model 1c). The result indicates that instead of helping to reduce the effect of crisis on bank risks, the blanket guarantee policy causes banks to take more risks. This phenomenon is consistent with the moral hazard theory, where banks interpret the implementation of the deposit insurance as an incentive to take more risks to improve their profitability (Forssbaeck, 2011). This phenomenon is also consistent with studies done by Hadad *et al.*, (2011), Caprio and Honohan (2004), and Dermiguc-Kunt and Huizinga (2004) where the implementation of the blanket guarantee scheme weakens the level of market discipline. This result indicates that such guarantee tends to create excessive risk taking by banks during the crisis period.

In terms of control variables, we found that the quality of credit portfolio as measured by loan loss provision (PROV) to total loans has a negative and statistically significant effect on bank risks. This indicates that loan loss provision is associated with high risks due to bad loan portfolio or aggressive investment. In addition, worsening macro-economic conditions also increase the provision for loans. As the theory suggested, the provision of loans depends significantly on economic cycles. Thus, in economic downturns such as the crisis period, banks tend to prepare for possible negative impact by increasing provisions for loans as additional buffers, an outcome that is consistent with cyclical bank behaviours (Laeven & Majnoni, 2002; and Bikker & Hu, 2002).

Furthermore, bank capitals also positively and significantly affect bank risks. As suggested by Konishi and Yasuda (2004), capital requirements limit the risk-return frontier of banks, since it forces a reduction in leverage that might induce banks to reconfigure their portfolio of risk assets. This leads to the possibility of an increase in risk-taking behaviours. In that regard, this outcome implies that the high loss of bank owners in default conditions will reduce bank risk taking behaviors (Repullo, 2002). In addition, the country dummy was introduced to capture the possible importance of institutional differences among the samples (The excluded dummy category is Indonesia). Results show a significant effect only in the case of Thailand, which was negative in relation to Indonesia as a reference country.

Table 3: Deposit Insurance, Crisis, and Bank Risk

Variable	Model-1a	Model-1b	Model-1c
C	0.9292 0.3073	1.0326 0.2902	0.8039 0.4120
DIDUMMY	0.4815*** (0.0028)	0.4729** 0.0040	0.5934*** 0.0006
BSIZE	0.1381 0.3262	0.1227 0.4137	0.1272 0.3964
ROA	2.9595 0.6489	3.0496 0.6397	5.1058 0.4357
PROV	-0.8022 0.0008	-0.8000 0.0008	-0.7948 0.0008
CAPITAL	7.981*** 0.0000	7.9230*** 0.0000	8.0607*** 0.0000
PRIVATECRGDP	1.7174 0.0060	1.6674 0.0100	1.7471 0.0068
GDPGR	0.9827 0.6406	1.0740 0.6141	2.4010 0.2751
MALAYSIA	-0.7681 0.1533	-0.7157 0.2069	-0.7623 0.1773
THAILAND	-1.1674* 0.0681	-1.1173* 0.0919	-1.2763* 0.0546

Table 3 : (Cont.)

FILIPINA	0.1250	0.1307	0.1207
	0.5950	0.5796	0.6091
SINGAPORE	-1.0356	-0.9763	-1.0444
	0.1683	0.2098	0.1793
CRISISDUMMY		0.0310	0.5146**
		0.7691	0.0312
DIDUMMY *		-0.5658**	
CRISISDUMMY			0.0241
R-squared	0.1794	0.1796	0.1898
F-statistic	0.0000	0.0000	0.0000

Note: ***Significant at 1% level

** Significant 5% level

*Significant 10% level

(.) p-value

Table 4 presents the coefficient estimates of Model 2 which examines the impact of the deposit insurance implementation on systemic risk, where the independent variable is the volatility of banks' returns. Similar with Model 1, we also observed the impact of the implementation during the crisis period. The results in Table 4 show that instead of reducing bank systemic risk, the deposit insurance implementation enforces risks in the ASEAN region by increasing the volatility of banks' returns. This finding is consistent with the moral hazard hypothesis where banks tend to perceive the guarantee as an incentive to pursue higher profits by investing in risky assets (see for example: Forssbaeck, 2011; Hadad *et al.*, 2011; Caprio & Honohan, 2004; and Demirguc- Kunt & Huizinga, 2004).

Table 4. Deposit Insurance, Crisis, and Systemic Risk

Variable	Model -2a	Model-2b	Model-2c
C	0. 2303	0.1778	0.1359
	0.0741	0.2036	0.3267
DIDUMMY	0.0046	0.0047	0.0142**
	0.4477	0.4375	0.0224
BSIZE	-0.0045	0.0039	0.0079
	0.6490	0.7665	0.5381
ROA	-0.0852	-0.0771	0.1338
	0.7389	0.7634	0.5944
PROV	0.0012	0.0011	0.0019
	0.8933	0.9054	0.8302
CAPITAL	0.0713	0.0753	0.0941
	0.3100	0.2851	0.1682
PRIVATECRGDP	0.0897***	0,0916***	0.0967***
	0.0002	0.0002	0.0000

Table 4 : (Cont.)

GDPGR	-0,0936 0.2241	-0,1054 0.1769	-0,0019 0.9808
MALAYSIA	0.5028*** 0.0075	0.4942*** 0.0087	0.4888*** 0.0094
THAILAND	0.3976** 0.0493	0.3904* 0.0538	0.3762* 0.0630
FILIPINA	0.3632* 0,0520	0.3618* 0,0530	0.3604* 0.0539
SINGAPORE	0.8463* 0.0797	0.8309* 0.0855	0.8205* 0.0894
CRISISDUMMY		-0.0046 0.3358	0.0333*** 0.0002
DIDUMMY *	0.3358	-0.0455***	
CRISISDUMMY			0.0000
R-squared	0.0858	0.0878	0.1390
Prob(F-statistic)	0.0001	0.0002	0.0000

Note:

***Significant at 1% level

** Significant 5% level

*Significant 10% level

(.) p-value

Based on the result, it can also be seen that a crisis period significantly increases banks' systemic risk. However, when the guarantee is implemented during crisis times, it significantly lowers banks' systemic risks. This result is consistent with the ultimate goal of the guarantee. Furthermore, the result indicates that the crisis significantly increases banks' systemic risk. This result is consistent with Detragiache and Demirguc-Kunt (2000) who found that the deposit insurance system increases the possibility of bank failures due to weak institutions. This implies the importance of a strong and prudent banking system in preventing bank failures, especially during the crisis period.

CONCLUSION AND LIMITATIONS OF THE STUDY

This study has focussed on understanding the impact of the implementation of the deposit insurance system on bank risks and system stability in five ASEAN countries during the period between 2007-2008. Based on the result, it can be seen that the deposit insurance implementation reduces bank risk taking levels, a report that is consistent with the objective of the policy, i.e. to prevent systematic bank runs, especially in the crisis years which can thereby, lead to better system stability (Anginer *et al.*, 2014; Enkhbold & Otganshar, 2013; Gropp & Vesala, 2004). The findings noted in this study also suggest that banks are more prudent in the crisis period due to the guarantee provided to depositors. This means that the guarantee offered through the deposit insurance system provides a better system stability. However, instead of reducing the effect of the crisis, the implementation of the deposit guarantees caused banks to

take more risks (1c). Banks appear to translate this implementation as an incentive to take more risks (e.g. increase leverage) during the crisis, thereby, weakening market discipline (Hadad, *et al.*, 2011; Caprio & Honohan, 2004; Dermiguc-Kunt & Huizinga, 2004). Considering other factors that may affect bank risks and stability, this study also found that loan loss provision is associated with high risks due to bad loan portfolio or aggressive investments.

Since there are some limitations to this study, we need to consider other factors that might affect the analysis as a means to improve the practicality of the findings. For example, we did not include the impact of bank ownership on risks, i.e foreign ownership. Although our findings noted that the deposit insurance system lowers bank risks, bank ownership was omitted and this factor could bring both positive and negative effects on bank risk taking behaviours. It is recommended that other measures of systemic risks be observed under crisis conditions and this can include marginal expected shortfall (MES) as suggested by Acharya (2010). Lastly, it is also important to include the effect of increasing competition in the ASEAN market, taking into account the implementation of the ASEAN Economic Community (AEC) in 2015 so as to see how this affects banks' risk-taking behaviours. The findings of this study have indicated that the implementation of a deposit insurance policy helps to decrease bank risk but it increases banking stability of ASEAN banking markets during the crisis period of 2007-2008.

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