“Impact of deposit insurance on banking industry of ASEAN countries: in quest of stability”

AUTHORS	Suhal Kusairi Nur Azura Sanusi Abdul Ghafar Ismail

ARTICLE INFO	Suhal Kusairi, Nur Azura Sanusi and Abdul Ghafar Ismail (2015). Impact of deposit insurance on banking industry of ASEAN countries: in quest of stability. *Banks and Bank Systems*, *10*(4), 41-50
RELEASED ON	Tuesday, 15 December 2015
JOURNAL	"Banks and Bank Systems"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES **0**

NUMBER OF FIGURES **0**

NUMBER OF TABLES **0**

© The author(s) 2026. This publication is an open access article.

Suhal Kusairi (Malaysia), Nur Azura Sanusi (Malaysia), Abdul Ghafar Ismail (Malaysia)

Impact of deposit insurance on banking industry of ASEAN countries: in quest of stability

Abstract

The purpose of this paper is to study the impact of deposit insurance towards the stability of banking industry. The stability is measured by the ratio of retail deposit to total asset and the ratio of loan to total asset to cover both positive and negative impacts. By using panel data of 127 commercial banks from 2000 to 2013 in ASEAN region that consists of Indonesia, Malaysia, Singapore, Philippine, Thailand and Vietnam. Through the utilization of panel data analysis, the result states that the implementation of deposit insurance policy negatively affects on the ratio of retail deposit to total asset while positively affects on the ratio of loan to total asset. It is very interesting finding as it implies that the deposit insurance policy causes the banking manager taking higher risk and increases their return rather than the deposit insurance policy that increases the confidence level of depositors, which in turn will increase the total deposit. In addition, the result also states that an increase in the ratio of loan to equity and sizes of bank will increase the ratio of the retail deposit to total asset and the ratio of loan to total asset. But, the effect of net interest margin on the ratio of retail deposit to total asset is negative while it is positive on the ratio of loan to total asset. This result is very important for the regulators to evaluate the deposit insurance policy and anticipate of any negative circumstances which will be incurred.

Keywords: deposit insurance, banking industry stability, risk taking and moral hazard.
JEL Classification: G21, E58.

Introduction

Financial crisis during 1997-2008 exposed the valuable learning for banking industry and banking regulator in ASEAN region about the safety of retail depositor's money and trustworthiness of financial market problems. This problem will bring to the systemic risk when the regulator cannot properly control the market and financial crisis becomes deeper. To avoid the systemic risk, since at the end of the twentieth century, banking regulator proposed the deposit insurance program and started the implementation by 2000-2005 where banking sector insured the deposit from customers. The program is not new for banking industry in the United States as it already uses it in the early years of 1800s as mentioned by Calomiris and White (1994).

The academicians, practitioners and regulators have been discussing this program until today. The concentration of their discussion focuses on the benefits and cost of deposit insurance. Why? The real facts show that the financial crisis especially banking crisis still occurred in part of the world, especially the banking system in the United States (US) even though they have applied the deposit insurance for some years.

In addition, based on the learning process, the implementation of deposit insurance always evolves in line with the problem in banking industry. For instance, in 1993 US financial system implemented explicit deposit insurance policy, meaning that the government will cover the bank depositors when banking crisis happens. Due to the implicit policy, it did not effectively support the stability when a banking industry faced certain crisis. Japan established a policy in 1971 with mandate to protect depositors which contributes to the financial stability and assists in orderly resolution of bank problems. In 1996, the law was amended again to incorporate a bank guarantee. In 1998 legislation was enhanced further to allow the DICJ (Deposit Insurance Corporation of Japan) nationalization power. In 2005 demand and time deposits were put under a limited guarantee of ¥10 million (Walker, 2006).

Diamond and Dybvig (1983) identified that the implementation of deposit insurance did not affect to the stability of banking industry. They argue that the deposit insurance have brought the higher operational cost for banks, and the bank manager will try to take the opportunity to increase their return by investing in higher risk investment as compensation due to they know the deposits have already been insured. Other argument is that the effectiveness of the implementation deposit insurance depends on the structure of financial development of a particular country.

In contrast with previous results, an introduction and implementation of deposit insurance give benefit to banking sector. Imay (2006) stated that implementation of deposit insurance ensured the stability of banking industry because total deposit was insured. Then there is no rational reason for depositors rushing to withdraw the money which causes the systemic problem in banking industry. Depositors get back their insured money easily and fast

© Suhal Kusairi, Nur Azura Sanusi, Abdul Ghafar Ismail, 2015.
Suhal Kusairi and Nur Azura Sanusi, School of Social and Economic Development, Universiti Malaysia Terengganu, Malaysia.
Abdul Ghafar Ismail, Islamic Research and Training Institute Islamic Development Bank, Jeddah, Kingdom of Saudi Arabia, and School of Economics Universiti Kebangsaan Malaysia, Malaysia.

when there is financial crisis. There is no chance for negative rumors that influence the stability of banking industry.

Therefore, there is an opportunity for discussion whether implementation of this deposit insurance produces the stability of the banking industry or otherwise. It may lead to inefficiency in the utilization of fund to establish the deposit insurance policy where the objective is to maintain and increase deposit. But the benefits may not be able to compensate the cost in introducing the deposit insurance policy. On the contrary it is possible that the management of bank will take the opportunity to taking higher risk.

In this study, we will try to provide the significance argument that the implementation of deposit insurance will affect on the behavior of depositor, bank and central bank. According to La Porta (2002), it is stated that the implementation of certain regulation will affect differently to agent in the financial system and it also depends to landscape of financial system itself for instance the level of financial system development, the law origin and others.

The rest of discussion is structured as follows; Section 1 discusses the relevance literature regarding to the deposit insurance and the banking industry stability. The discussion focuses on the deposit insurance from the perspective of depositors, banks and regulators as well. In addition, the benefits, costs and risks for the implementation of deposit insurance are also discussed. Section 2 explains the data and implementation of deposit insurance in several ASEAN countries. It provides the background of banking industry in ASEAN countries, the historical of deposit insurance in term of the characteristics of policy. Section 3 provides the model and method of analysis by considering the theoretical framework, objective and type of data. Section 4 discusses the results, this section tests the proposed model and discusses the findings based on the best model selected, and final section concludes the findings and the policy implication.

1. Literature reviews

Basic argument for the implementation of deposit insurance is for sharing risk between banks and insurance provider, ensuring the safety of depositor's fund, reducing risk when financial crisis happens and finally to develop the soundness of banking industry. Diamond and Dybvig (1983) state that benefit of deposit insurance is to ensure the stability of banking system from systemic risk problem. By implementing the deposit insurance there is no reasons for depositors to worry about their money because their money is already insured and safe.

Mondschen and Opiela (1999) explore the influent of changes in deposit insurance on the market for bank deposits in Poland. They state that different law and regulation will give different insurance coverage, another internal factor of bank is less important in explaining different deposit interest rates. They also find that there is negative relation between market discipline and deposit insurance coverage. In this case, it is generally supported by La Porta (2002) that the differences of the origin law will impact the behavior of all players in the financial system.

Laeven (2002) gives a deeper analysis between cost of deposit insurance and differences in the governance structure of financial system using broader sample of 144 banks in various emerging countries over the period 1991-1998. He finds that different ownership structure has different cost level where private bank ownership has higher cost compare to public bank, which implied that risk taking of private bank is higher than public bank. It is not a surprise because the public bank implicitly already insured by government and Chernykh and Cole (2011) find that the implementation of deposit insurance will shift the depositors from public bank to the private banks.

Beside that the issue that is related with deposit insurance policy and financial system stability is the impact of deposit insurance premium on the fiscal cost and risk taking. Honohan and Klingebiel (2003) analyze the influent of blanket guarantees on the full fiscal costs of resolving banking system distress. Using forty separate crises experienced in 1980-1997, it states that unlimited deposit guarantees and capital forbearance increase the ultimate fiscal cost of resolving a banking crisis.

In addition, Gueyie and Lai (2003) forecast the impact of implementation of fixed-rate deposit insurance in Canada. Their analysis uses data from 1959 to 1982 from five listed banks, the result states that various market-based measures of risk-taking increased when capital ratios decreased, following its implementation in 1967.

Similarly, Gonzales (2005) examines how regulatory restrictions affect bank rent value and bank risk-taking. Using a sample of 251 banks in 36 countries, he found that deposit insurance gives an incentive to banks for taking higher risk, and that different stage of level governance reduces the incentives for such risk-shifting. He shows that deposit insurance increases bank rent value. In addition, Duan et al. (1992) examine whether banks shift gives risk to the deposit insurer. Using a sample of 30 large publicly traded US banks, they find that banks are largely unsuccessful in increasing their actuarial liabilities to the deposit insurer.

In addition, Cull et al. (2005) find that the benefit of deposit insurance on the stability of banking system depends on the toughness of regulation. Using cross country data, the result stated that deposit insurance has negative relationship with financial development and growth, except for the country with strong regulation and financial institution. The result implied that implementation of deposit insurance does not directly increase the confidence of depositors and indirectly increases the total deposit from costumers but actually depending on the regulation and financial institution.

Angkinand (2009) addresses the relationship between deposit insurance policy and cost of financial crisis. Using 47 financial crises from 35 countries, during 1970-2003 she found that deposit insurance can reduce output cost of bank crisis, is lower in country with high deposit insurance coverage. In other words, the implementation of explicit deposit insurance has a positive impact to the banking industry stability and increase the coverage of insured deposit which will reduce the negative effect of the financial crisis.

In contrast, Chernykh and Cole (2011) find that banks entering the new deposit-insurance system increased both level of retail deposits and ratios of retail deposits to total assets relative to banks that did not enter the new deposit-insurance system. They utilize a multivariate panel-data analysis that controls for bank and time random effects in addition to a number of control variables. They also find that the longer period for a bank that enters into the deposit insurance policy system, it has the greater for both its level of retail deposits and the ratio of retail deposits to asset respectively.

Forssbaeck (2011) analyzes the impacts of market discipline by creditors and ownership structure on banks' risk taking in the presence of partial deposit insurance. By utilizing the traditional agency-cost theory for explaining how the impacts of creditor discipline and shareholder control are interdependent, the non-monotonic effect of shareholder control, and the role of leverage. The research samples are several hundred banks worldwide period 1995-2005 and he uses the panel regression model. The results determine that a negative individual risk effect of creditor discipline and the expected convex effect of shareholder control. Implied that increased shareholder control significantly strengthens the negative effect of market discipline on the asset risks, but joint effects on overall default risk are limited. The existence of deposit insurance reduces market discipline by the bank's creditors, and introduces a subsidy on increased risk, but the size of this subsidy depends on the agency cost structure of the bank, and therefore on its ownership structure.

Continuously, Morrison and White (2011) provided a rational argument in term of the provision of deposit insurance. They considered the banking institution presents both adverse selection and moral hazard, which indicates that a social benefits of bank monitoring must be shared between depositors and banks. Socially it is difficult for deposits to reach equilibrium. Thats why, deposit insurance and bank recapitalization should make a correction of this market failure. As implication of this result, the deposit insurance should not be funded by government through general taxation. The optimal premium of the deposit insurance negatively depends on the quality of the banking system. It is implied that when the soundness of the financial sector is very good, governments should not support deposit insurance schemes and vice versa.

Mälkönena and Niinimäkib (2012) study on the restructuring of deposit insurance policies of multinational banks and how the home countries share the financial burden when the financial crisis occurs. They develop a bargaining model derived from the Nash equilibrium that taking into account the key components of policy negotiations which will likely emerge and consider the cross-border externalities that shape the regulators' decision whether to liquidate or recapitalize the multinational bank (MNB). The results state that when options are available, regulators have a power to share financial burden, normally the home country has more bargaining power, when the liquidation cost is less than the recapitalization cost with the foreign country of bank, since the home country has the legal right to liquidate or close the bank. But the practise of European countries will charge a higher premium. Conversely, if the applicable panic of risk occurs and breakdowns the policy negotiation will effect on home country. Based on the scenario normal and panic risks. The model illustrates that country with a higher expected cost of panic risk is more likely to share the higher total cost burden, the cost of panic risk is negative externality for the banks with plenty of deposits in the MNB. It will expose the higher cost of panic risk for home country because a panic of among uninsured depositor destroys the value of the MNB. In other words, the home-country with plenty of deposits in the MNB will expose the higher cost of panic risk. Therefore, home-country will restructure the deposit insurance policy from implicit to fully coverage or increase the coverage amount to stabilize the banking industry.

In contrast, Engineera and Schurea (2013) explore the provision of deposit insurance basing on the non-cooperative policy game between countries. Countries compete for deposits in order to protect their banking systems from the destabilization problem due to the potential effect of capital flight. Policies and rules are

chosen to attract depositors who rationally and optimally response to the expected return to deposits, which depends on deposit insurance levels, systemic risks and transaction costs. They identify both scenario policies; defensive and non-defensive policies of neighbor countries. In other words, the deposit insurance is determined by competition between countries for international deposit flows. They assess the costs of providing deposit insurance against the benefit of preventing capital flight which could further destabilize the domestic banking system. Depositors maximize a return of deposit therefore they always give a response towards any changes of deposit insurance policy from any countries. When an unexpected negative shock happens regarding the premium insurance then depositor will withdraw from the particular country. The model completely illustrates from the standard normative rationales for deposit insurance: if countries are symmetric, both are better off without the deposit insurance and achieve this outcome in the absence of shocks. In the model, deposit insurance is an inefficient respond to shocks or the presence of asymmetries.

Other issues are related to the pricing and the progress the implementation of deposit insurance. Ho et al. (2014) state that financial reforms and capital adequacy are probably the most critical issues for the banking industry in the world. They investigate the effectiveness of financial reform, measure the adequacy of deposit insurance fund and design reserve ratio and implicit cost of government guaranty of deposit insurance fund. The findings show the lower average premium of deposit insurance for financial holding company compared to sampled banks despite the financial holding companies are larger, and also designed reserve ratio and implied reserve for certain years are differentce. Indirectly this finding against the fair premium that should base on the size of insured deposit and asset risk. The results implied that the fixed target ratio for the deposit insurance fund may not be appropriate. Nevertheless, generally financial reform in Taiwan is able to protect the systemic crisis and lower volatility of deposit insurance.

Boyle et al. (2015) investigate the effectiveness of the deposit insurance implementation at the early of a banking crisis. By using a conjoint analysis approach in considering the simultaneous impact of multipledeposit insurance characteristics and various contrary facts. The sample is multinational bank how they would inspect the hypothetical account profiles following the failure of a large competing bank. The results stated that such a policy response may only be partially successful, at least compared to the effectiveness of a pre-existing insurance scheme. Depositors from countries without deposit insurance clearly indicate they would withdraw a greater percentage from insured accounts, and require a higher interest premium when these accounts to be maintained, than depositors from countries with explicit deposit insurance. The findings implied that, more magnanimous insurance schemes are more effective in reducing these systemic risk and funding risks but it will become big problem if the pricing is not optimal because government will pay a higher cost.

Demirguc-Kunt et al. (2015) put their efforts to develop the comprehensive global database of deposit insurance policy all over the world as continuation of their effort that have been undertaken before. The database does not only include the current country which implements the deposit insurance, explicit and implicit scheme, coverage (limit and government guarantee) and funding but also the detail information on the use of government guarantee toward bank's liability, asset and current changes in respond to financial crisis. They found some interesting findings that the deposit insurance has become more widespread and more extensive in coverage since the global financial crisis, mostly effective to protect the deposit runs but under premium. Which also indirectly brings to the potential of destruction risks due to temporary increase in the government protection of non-deposit liabilities and bank assets, increase of safety net and derivative product, finally it will increase the moral hazard that government should concern to reduce it.

2. Implementation of deposit insurance in ASEAN countries

Implementation of deposit in ASEAN countries is quite new comparing with the advanced countries in the world. In most cases they are entering to this explicit deposit insurance policy after the financial crises in 1997 occurred except the Philippines which entered to the deposit insurance policy in 1963. Table 1 shows the time line, type of deposit insurance and coverage.

Table 1. Implementation of deposit insurance in ASEAN countries

Country	Adoption/implicit	Explicit/partial	Explicit/fully or GDG
Indonesia	1998	22/09/2005	13/10/2008
		RP100m	RP200b (97%)
Malaysia	1998	1/9/2005	16/10/2008-31/12/2010
		RM60.000	Fully coverage
Philippine	1963	2004	21/10/2008

Table 1 (cont.). Implementation of deposit insurance in ASEAN countries

Country	Adoption/implicit	Explicit/partial	Explicit/fully or GDG
		PESO 250.000	PESO 500.000
Singapore	2001	2006	16/10/2008-31/12/2010
		SGD20.000	Fully coverage
Thailand	1997	11/8/2008	24/10/2008-10/8/2011
		Fully coverage	Fully coverage
Vietnam	9/11/1999	2000	2008
		50m	50m

Indonesia starts discussion and adopts the implicit deposit insurance policy after financial crises 1997. In 2005 Indonesia developed and declared the explicit deposit insurance after implementing Act No. 24/2004. It is a separate legal entity. Membership is compulsory for all deposit taking deposit institution. Starting with partial coverage RP 100 million and increase to become RP 200 billion due to global financial crises attack in 2008.

Malaysia starts discussion and adopts this policy after financial crisis of 1997. In 2005 it developed and declared the explicit deposit insurance after implementing Act 642/2005. It is a separate legal entity. Membership is compulsory for all deposit taking deposit institution. Starting with partial coverage RM60.000.00 and increase to fully coverage due to global financial crises attack in 2008-2009. The official deposit insurance coverage in Malaysia remains at RM60.000.00.

Philippine already established the deposit insurance at early 1963 and they call the PDIC. It is a separate legal entity. Membership is compulsory for all deposit taking institution. Total coverage is Peso 250,000 with 95.06% fully insured and financing solely from the premium on total deposit. PDIC regulated under deposit insurance Act 3951/2004 stated at the banking law. Premium is calculated by flat rate of 2%.

Singapore starts discussion and adopts this policy after financial of crisis 1997. In 2005 it developed and declared the explicit deposit insurance after implementing deposit insurance Act 2005. This act was included in Banking Law. Starting with partial coverage SGD20,000.00 and increase to fully coverage due to global financial crises attacked in 2008. The official deposit insurance coverage in Singapore remains at SGD20,000.00.

Thailand starts discussion and adopts this policy after financial crises 1997-1998. In 2005 it developed and declared the implicit deposit insurance after implementing Act B.E. 2551 (2008). This act was included in Banking Law. Starting and remaining with fully coverage until 2011.

Vietnam established deposit insurance (DIV) at the end of year 1999 after financial crises 1997. Vietnam developed and declared the explicit deposit insurance after implementing Act 2012/QH13. This act was included in established Banking Law. Starting with partial coverage of VND50 million and membership in the system is compulsory and banks must pay an annually premium equivalent to 0.15% of average balance of all total deposit insured.

3. Data and methodology

3.1. Research data. In this study we use the ASEAN countries banking database. The motivation is due to the region has almost the same background of the banking industry. In 1997-1998 they faced the financial crisis and followed by 2008-2009 global financial crises. In addition the region has the progressive economic development inside the financial development itself. Types of data are total retail deposit, total asset, total loan, total equity and net interest margin. Total sample is 127 banks from period 2000-2013. Source of data is the bank scope database, the deposit insurance corporation and the central bank of each country.

3.2. Research methodology. To explore the effect of an implementation of deposit insurance on the banking industry stability and sustainability we argue that the stability can be measured by the stability of the total retail deposit, ratio of retail deposit and total asset, the total loan and ratio of loan to total asset. In examining, the deposit insurance policy, we look from the date of the implementation of deposit insurance policy and we also control the effect of asset, leverage and net interest margin on total asset and total liability.

The effect of asset on total loan, if the asset increases then the banks are able to increase the loan to their consumers. In addition, an increase in bank's asset will increase total deposit due to banks are able to expand the business and finally will attract the depositor to save or invest their money. The influence of leverage on total deposit – if the leverage increases so that the total deposit also increases because the bank's leverage increase should be compensated with increase in revenue as a result of an increase in bank's loan that generates revenue.

Finally, the net interest margin (NIM) positively affects the total deposit because if NIM increases, it should attract the depositors to save or invest their money and at the same time banks are more able to provide more loans.

The benefit of deposit insurance implementation means bank can increase the confident level of depositors which will increase the total deposit. Opposite with benefit is cost of the deposit insurance due to the possibility of moral hazard that occurs when the deposit insurance is implemented, then bank will increase the total loan. Therefore, dependent variables will be presented by the ratio of total loan to total asset and also the ratio of total deposit to total asset – to absorb the effect of changes in total loan and total deposit respectively.

The model presented below will examine the effect of deposit insurance policy on the stability of banking industry:

$$DOA_{i,t} = \beta_0 + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LNA_{i,t} + \\ + \beta_4 NIM_{i,t} + \alpha_{i,t}. \quad (1)$$

$$LOA_{i,t} = \beta_0 + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LNA_{i,t} + \beta_4 NIM_{i,t} + \\ + \beta_5 DOA_{i,t} + \alpha_{i,t}. \quad (2)$$

Where $DOA_{i,t}$ is the stability of banking industry which is represented by asset stability. The asset stability is measured by the ratio of total retail deposit to total asset for bank-i at time period-t. $LOA_{i,t}$ is the stability of banking industry which is represented by the liability stability. The liability stability is measured by the ratio of total loan to total asset for bank-i at time period-t. DI is the deposit insurance policy; it is categorical or dummy variable. There are three categories; no deposit insurance policy, explicit partial deposit insurance policy (PDI) and government guarantee insurance or fully guaranty policy (FDI). $LNA_{i,t}$ is size of the bank presented by the natural log asset for bank-i at time period-t. $LEV_{i,t}$ is leverage for bank-i at time period-t represented by the ratio of total deposit to total equity. $NIM_{i,t}$ is the net interest margin for bank-i at time period-t and $\alpha_{i,t}$ is error term.

Since the study uses panel data, equation (1) and (2) can be rewritten as follows:

$$DOA_{i,t} = \beta_0 + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LNA_{i,t} + \\ + \beta_4 NIM_{i,t} + \alpha_{i,t} \quad i = 1..\ N,\ t = 1\ ..T \quad (3)$$

$$LOA_{i,t} = \beta_0 + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LNA_{i,t} + \\ + \beta_4 NIM_{i,t} + \beta_5 DOA_{i,t} + \alpha_{i,t} \quad i = 1..\ N,\ t = 1\ ..T \quad (4)$$

Based on equation (3) and (4), the influence of deposit insurance policy, size, leverage and net interest margin towards banking industry stability is estimated.

$$DOA_{i,t} = \beta_{0i} + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LNA_{i,t} + \\ + \beta_5 NIM_{i,t} + \alpha_{i,t}, \quad (5)$$

$$LOA_{i,t} = \beta_{0i} + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LAN_{i,t} + \\ + \beta_4 NIM_{i,t} + \beta_5 DOA_{i,t} + \alpha_{i,t}. \quad (6)$$

The term fixed effect from equation (5) and (6) although constant, can be different for individual banks, but it will not remain as a constant for a long period, that is known by "*time invariant*".

For random effect analysis by using base equation (5) and (6). Even though equation (5) and (6) stated that β_{0i} is fixed, we assumed that it is random variable with average value, β_0. Constant could be written as:

$$\beta_{0i} = \beta_0 + \varepsilon_i \quad i = 1,2, \ldots\ldots.., N \quad (7)$$

Where ε_i is error term with an average value of zero and variance σ^2. It replaces equation (5) and to equation (7), then the equation is as follows:

$$DOA_{i,t} = \beta_{0i} + \beta_1 DI_{i,t} + \beta_2 LEV_{i,t} + \beta_3 LNA_{i,t} + \\ + B_4 NIM_{i,t} + \alpha_{i,t} \quad (8)$$

$$\omega_{it} = \varepsilon_{it} + u_{it.} \quad (9)$$

Where error term composit ω_{it} consists of two components, namely ε_i is error for cross sectional component, and u_{it} is error in combination component of time series and cross-sectional. The same process for equation (6).

Panel data which combined cross section and time series data allows us to control the variables which cannot be observed or measured like country factors or companies as well as time variation. It accounts for individual and time heterogeneity. With panel data, we can include variables at different levels of analysis which are suitable for multilevel or hierarchical modeling and at the same time the trend of the data can be analyzed.

Model estimation started with pooled data, fixed and random effect where pooled data analysis assumed that a constant and the slop of regression equation are fixed whether individual or time varies. It is not appropriate for panel data due to a lot individual and time variance.

Random and fixed effect is to investigate whether the model followed random effect or fixed effect by applying the Hausman test. Null hypothesis is random effect (individual effect uncorrelated) and alternate hypothesis is fixed effect. The statistical test $\chi^2_{hit} = (b-\beta)'Var(b-\beta)^{-1}(b-\beta)$, where b is coefficient for random effect and β is coefficient for fixed effect. The null hypothesis is rejected if $\chi^2_{hit} \succ \chi_{(k,\alpha)}$.

4. Research results

Table 2 (Panel 2a) shows the result of panel data analysis for the ratio of retail deposit to total asset (DOA) model and the ratio of total loan to total asset (LOA)

model. The result of pooling data analysis show that the ratio of loan to total equity (LEV), sizes (LNA) and net interest margin (NIM) affect the ratio of retail deposit to total asset at a significant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity, sizes and net interest margin will increase total retail of the ratio of retail deposit to total asset. Result for deposit insurance policy shows negative effect on the ratio of retail deposit to total asset for both partial deposit insurance (PDI) and full deposit insurance (FDI) at a significant level of 1%. It is very interesting finding due to this result implied that deposit insurance policy increases the banking manager to taking higher risk to compensate the additional cost and increase their return rather than deposit insurance policy will increase the confidence level of depositor and finally will increase total deposit. All contribution of all independent variable to the ratio of retail deposit to total asset is 56% as showed by R square.

The result of fixed effect analysis shows that the ratio of loan to total equity (LEV) and sizes (LNA) affect the ratio of retail deposit to total asset at asignificant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity and sizes will increase total retail the ratio of retail deposit to total asset. But the net interest margin has negative effects on the ratio of retail deposit to total asset but it is not a significant. The result implied that an increase of net interest margin will decrease total retail of the ratio of retail deposit to total asset. In addition, the deposit insurance policy where negative effect on the ratio of retail deposit to total asset is shown at a significant level of 1%. All contribution of all independent variables to the ration of retail deposit to total asset variable is 68% as shown by R square.

Table 2. Result of panel data analysis

Independent variable	DOA Model (Panel 2a)				LOA Model (Panel 2b)			
	OLS Model	RE Model	FE Model	PCSE Model	OLS Model	RE Model	FE Model	PCSE Model
LEV_{it}	0.004*** (0.0009)	0.002*** (0.0007)	0.002*** (0.0007)	0.002*** (0.0005)	0.008*** (0.0007)	0.005*** (0.0006)	0.005*** (0.006)	0.005*** (0.001)
LNA_{it}	0.041*** (0.0011)	0.040*** (0.0009)	0.040*** (0.0009)	0.040*** (0.0011)	0.029*** (0.0012)	0.026*** (0.0011)	0.025*** (0.0012)	0.025*** (0.0012)
NIM_{it}	0.009*** (0.0015)	-0.005 (0.0012)	-0.001 (0.0012)	-0.0012 (0.0019)	0.011*** (0.0012)	0.007*** (0.0010)	0.007*** (0.0010)	0.007*** (0.0019)
DOA_{it}					-0.013 (0.0184)	0.066*** (0.0207)	0.080*** (0.0220)	0.080*** (0.0238)
PDI	-0.067*** (0.0127)	-0.042*** (0.0092)	-0.040*** (0.0092)	-0.039*** (0.0136)	0.020*** (0.0099)	0.047*** (0.0082)	0.050*** (0.0083)	0.050*** (0.0127)
FDI	-0.047*** (0.0153)	-0.022** (0.0110)	-0.020* (0.0111)	-0.0195 (0.0167)	0.022*** (0.0119)	0.050*** (0.0098)	0.054*** (0.0099)	0.054*** (0.0136)
Constant	0.014 (0.0124)	0.050 (0.0172)	0.053*** (0.0086)	0.053*** (0.0078)	0.011 (0.0096)	0.017 (0.0128)	0.017* (0.0078)	0.017** (0.0081)
R^2	0.5616	0.6822	0.6823	0.852	0.5990	0.6858	0.6860	0.7944
F (Wald) test	454.01***	3598.10***	706.92***	67.1870***	440.91***	3668.03***	599.04**	52.999**
SEE / σ_v	0.220	0.1381	0.1381	0.1281	0.1722	0.1231	0.1231	0.1231
σ_u		0.1672				0.1153		
θ		0.7844				0.7256		
BP-LM test	3975.58***				2525.32***			
Hausman test		35.17***				26.37***		
F test			23.24***				14.44***	
Heteroskedasticity (Wald test)			55425.40***				13721.99***	
Serial correlation (Wooldridge test)			130.05**				124.539***	
NxT	1778	1778	1778	1778	1778	1778	1778	1778

Source: figures in the parenthesis are standard errors, except for *F* (Walt) test, BP-LM test, Hausman test, *F* test, Heteroskedasticity and Serial correlation are *p*-values. *** $p \leq 1\%$, ** $p \leq 5\%$ and * $p \leq 1\%$.

Similarly result with the fixed effect model for random effect analysis shows that the ratio of loan to total equity (LEV) and sizes (LNA) affect the ratio of retail deposit to total asset at a significant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity and sizes will increase total retail of the ratio of retail deposit to total asset. But the net interest margin affects the ratio of retail deposit to total asset for both PDI and FDI at a significant level of 1%, with negative effect. The result implied that an increase of net interest margin will decrease total retail of the ratio of retail deposit to total asset. In addition, the deposit insurance policy where negative effect on the ratio of retail deposit to total asset is shown at a significant level of 1%. All contribution of all independent variables to the retail deposit

to total asset variable is 67% as shown by Adjusted R square.

Table 2 (Panel 2b) also shows the result of panel data analysis for the ratio of loan to total asset (LOA) model. The result of pooling data analysis shows that the ratio of loan to total equity (LEV), sizes (LNA) and net interest margin (NIM) affect the ratio of loan to total asset at a significant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity, sizes and net interest margin will increase total retail of the ratio of retail deposit to total asset and the ratio of loan to total asset. Result for deposit insurance policy shows positive effect on the ratio of loan to total asset for both PDI and FDI at a significant level of 1%. All contribution of all independent variable to the ratio of loan to total asset is 60% as showed by R square.

The result of fixed effect analysis shows that the ratio of loan to total equity (LEV) and sizes (LNA) affect the ratio of loan to total asset at a significant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity and sizes will increase the ratio of loan to total asset as well. But the net interest margin has negative effects on positive effect on the ration of loan to total asset for both PDI and FDI at a significant level of 1%. The result implied that an increase of net interest margin will increase the ratio of loan to total asset. In addition, the deposit insurance policy where positive effect on the ratio of loan to total asset is shown at a significant level of 1%. All contribution of all independent variable to the ratio of loan to total asset is 69% as shown by R square.

Similarly result with the fixed effect model for random effect analysis shows that the ratio of loan to total equity (LEV) and sizes (LNA) affect the ratio of loan to total asset at a significant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity and sizes will increase total retail of the ratio of retail deposit to total asset and the ratio of loan to total asset. But the net interest margin affects the ratio of loan to total asset for both PDI and FDI at a significant level of 1%, with positive effect. The result implied that an increase of net interest margin will increase the ratio of loan to total asset. In addition, the deposit insurance policy shows positive effect on the ratio of loan to total asset at a significant level of 1%. All contribution of all independent variable to the ratio of loan to total asset is 67.3% as shown by adjusted R square.

Basic robustness test of the three model results; pooled OLS model, random effect model and fixed effect model were accomplished by using the BP-LM test and Hausman test. BP-LM test is used for selecting on whether to use pooled OLS model or random effect model. Table 2 and 3 show the result of BP-LM statistic (χ^2) is 2525.32 with a significant level at less than of 1%. Here, the null hypothesis states that variances across entities are zero or there is no random effect. Therefore, based on the result, the null hypothesis is rejected and concluded that random effect is appropriate. There is an evidence of significant differences across countries. In other words, it has indicated that pooled OLS model was rejected, therefore the correct one is RE model. For selecting whether fixed effect or random effect, the Hausman test is used. Tables 2 and 3 also show the result of Hausman test where it is indicated that random effect was rejected due to the Hausman statistic (χ^2) is 26.37 with a significant level at lower than 1%. This means the null hypothesis of random effects as correct model is rejected. Therefore, based on this test it is clearly shown that fixed effect model is correct model compare to random effect model. This result is also supported by F test result, which is 14.44 with a significant level at less than 1%. Null hypothesis is rejected. Therefore at least one group/time specific intercept *ui* is not zero and concludes that there is a significant fixed effect or significant increase in goodness-of-fit in the fixed effect model. The fixed effect model is better than the pooled OLS.

Continuously, because testing result states that the best model is FE model so that next testing should focus on heteroskedasticity and serial correlation to get the robust model. Result of heteroskedasticity test indicates that modified Wald statistic (χ^2) is 13721.99 with a significant level at lower than 1%. Here, null hypothesis is rejected, this means the variances are not constant. Due to the existence of heteroskedasticity problem, testing continued by conducting the serial correlation. Result of serial correlation test indicates that Wooldridge statistic is 124.539 with a significant level at lower than 1%. Here, null hypothesis is rejected, this means the first order is autocorrelation. In conclusion, based on these testing, the fixed effect model should be extended to panel corrected standard errors (PCSE) as the best model in explaining the behavior of deposit insurance policy to the ratio of retail deposit to total asset and the ratio of loan to total asset as presenting of stability banking industry.

Tables 2 (Panel 2a and 2b) show the result of PCSE model that the ratio of loan to total equity (LEV) and sizes (LNA) affect the ratio of retail deposit to total asset (DOA) and the ratio of loan to total asset (LOA) at a significant level of 1%, with positive effect. The result implied that an increase of the ratio of loan to total equity and sizes will increase total retail of the ratio of retail deposit to total asset and the ratio of loan to total asset as well. But the net interest margin has negative effects on the ratio of retail deposit to total asset but it is not a significant and positive effect on the ratio of loan to total asset at a significant level of

1%. The result implied that an increase of net interest margin will decrease total retail of the ratio of retail deposit to total asset and increase the ratio of loan to total asset. In addition, the deposit insurance policy where show negative effect on the ratio of retail deposit to total asset and positive effect on the ratio of loan to total asset for both PDI and FDI at a significant level of 1%, except FDI is not significant on DOA. All contribution of all independent variable to the ratio of retail deposit to total asset variable is 85% and 80% to the ratio of loan to total asset as shown by R square.

The results are very interesting due to: the negative impact on the retail deposit and positive impact on the bank loan. The result implies that the deposit insurance policy encourages the bank manager to taking higher risk with an increase in loan to compensate the additional cost and increase their return rather than the deposit insurance policy that increases the confidence level of depositor and finally increases the total retail deposit. This result supports the study done by Gonzales (2005) and Morrison and White (2011) which stated the deposit insurance policy gives an incentive to banks for taking higher risk. In addition, implementation of deposit insurance policy in ASEAN countries is not supported by strong regulation shown by decreasing trend in the total retail deposit and potentially disclose to moral hazard activity. In other words, the policy does not directly increase the confident level of depositors, generally supported by Cull et al. (2005).

Conclusion

The objective of the paper is to analyze the effect of the deposit insurance policy implementation towards the stability of banking industry. Theoretically, we find that the benefit of deposit insurance implementation is to stabilize the banking industry, here we present it with the ratio of retail deposit to total asset. Opposite of the benefit is cost of the deposit insurance policy. However, the implementation of deposit insurance would result on the possibility of moral hazard problem, therefore we use the ratio of total loan to total asset and the ratio of retail deposit to total asset as dependent variable. The independent variables are deposit insurance policy, total asset, leverage and net interest margin.

The estimation result shows that the ratio of loan to total equity and size positively affect the ratio of retail deposit to total asset. The result also implies that an increase of the ratio of loan to total equity and size will increase the ratio of the total retail deposit to total asset and the ratio of loan to total asset. But the effect of net interest margin on the ratio of deposit to total asset is negative while on the ratio of loan to total asset is positive. The result implies that an increase of net interest margin will decrease the ratio of retail deposit to total asset and at the same time it will increase the ratio of loan to total asset. In addition, the deposit insurance policy negatively affects on the ratio of retail deposit to total asset and positively affects on the ratio of loan to total asset respectively.

The results are very interesting, because the deposit insurance policy will increase the bank manager to taking higher risk in compensating of an additional cost of the implementation of deposit insurance in ASEAN countries and increase their return rather than the deposit insurance policy that increases the confidence level of depositors and finally will increase the total deposit. Indirectly the deposit insurance policy will increase the possibility of moral hazard in banking industry.

Reference

1. Angkinand, A. (2009). Banking regulation and the output cost of banking crises, *Journal of International Financial Markets. Institutions and Money* 19, pp. 240-257.
2. Boyle, G., Stover R., Tiwana, A. & Zhylyevskyy, O. (2015). The impact of deposit insurance on depositor behavior during a crisis: A conjoint analysis approach, *The Journal of Financial Intermediation 24*, 4, 590-601.
3. Calomiris, C., White, E. (1994). The origins of federal deposit insurance. In: Goldin, C., Libecap, G. (Eds.). University of Chicago Press, Chicago, pp. 145-188.
4. Cull, R., Senbet, L., Sorge, M. (2005). Deposit insurance and financial development, *Journal of Money*, *Credit and Banking* 37, pp. 43-82.
5. Chernykh, Lucy and Cole, Rebel, A. (2011). Does deposit insurance improve financial intermediation? Evidence from the Russian experiment, *Journal of Bannking and Finance*, 35, pp. 388-402.
6. Duan, J., Moreau, A., Sealey, S. (1992). Fixed-rate deposit insurance and risk-shifting behavior at commercial banks, *Journal of Banking and Finance*, 16, pp. 715-742.
7. Demirguc-Kunt, A., Detragiache, E. (2002). Does deposit insurance increase banking system stability? An empirical investigation, *Journal of Monetary Economics*, 49, pp. 1272-1406.
8. Demirgüç-Kunt, A., Huizinga, H. (2004). Market discipline and deposit insurance, *Journal of Monetary Economics*, 51, pp. 375-399.
9. Demirguc-Kunt, A., Kane. E., Laeven, L. (2006). Determinants of deposit-insurance adoption and design. World Bank Policy Research working paper No. 3849.
10. Demirgüc-Kunta, A., Kane, E. & Laevenc, L. (2015). Deposit insurance around the world: A comprehensive analysis and database, *Journal of Financial Stability*, 20, pp. 155-183.

11. Diamond, D., Dybvig, P. (1983). Bank runs, deposit insurance and liquidity, *Journal of Political Economy*, 91, pp. 401-419.
12. Engineera, M.H., Schurea, P. & Gillis, M. (2013). A positive analysis of deposit insurance provision: Regulatory competition among European Union countries, *Journal of Financial Stability*, 9, pp. 530-544.
13. Forssbaeck, Jens. (2011). Ownership structure, market discipline, and banks' risk-taking incentives under deposit insurance, *Journal of Banking & Finance*, 35, pp. 2666-2678.
14. Ho, Chia-Ling., Lai, Gene C., & Lee, Jin-Ping. (2014). Financial reform and the adequacy of deposit insurance fund: Lessons from Taiwanese experience, *International Review of Economics and Finance*, 30, pp. 57-77.
15. Honohan & Klingebiel. (2003). Controlling Fiscal Costs of Banking Crises, *Journal of Banking and Finance*, 27, pp. 1539-1560.
16. Imay. (2006). Market discipline and deposit insurance reform in Japan, *Journal of Bannking and Finance*, 30, pp. 3433-3452.
17. Gonzales, F. (2005). Bank regulation and risk-taking incentives: an international comparison of bank risk, *Journal of Banking and Finance*, 29, pp. 115-1184.
18. Gueyie, J., Lai, V. (2003). Bank moral hazard and the introduction of official deposit insurance in Canada, *International Review of Economics and Finance*, 12, pp. 247-273.
19. La Porta, R., Lopes-de-Silanes, F., Shleifer, A. (2002). Government ownership of banks, *The Journal of Financ*e, 57, pp. 265-300.
20. Laeven, L. (2002). Bank risk and deposit insurance, *World Bank Economic Review*, 16, pp. 109-137.
21. Mälkönena, Ville & Niinimäkib, J.-P. (2012). Blanket guarantee, deposit insurance and restructuring decisions for multinational banks, *Journal of Financial Stability*, 8, pp. 84-95.
22. Mondschean, T., Opiela, T. (1999). Bank time deposit rates and market discipline in Poland: the impact of State ownership and deposit insurance reform, *Journal of Financial Services Research*, 15, pp. 179-196.
23. Morrison, Alan D & White, Lucy. (2011). Deposit insurance and subsidized recapitalizations, *Journal of Banking & Finance*, 35, pp. 3400-3416.
24. Walker, David K. (2006). *New deposit insurance systems in East Asia*. Occasional Papers No. 44. The South East Asian Central Banks Research and Training Centre. Kuala Lumpur. Malaysia.