Journal of Finance and Bank Management
June 2014, Vol. 2, No. 2, pp. 178-204
ISSN: 2333-6064 (Print) 2333-6072 (Online)

Published by American Research Institute for Policy Development

Depositor Discipline and Bank Risk-Taking Behavior: Evidence from the South-East Asian Financial Crises

Mohammed Ershad Hussain[1], M Kabir Hassan[2] & Mahfuzul Haque[3]

Abstract

We find evidence that depositors do not monitor banks strictly (weak state of depositor discipline) when their deposits are guaranteed by the government either explicitly or implicitly. Therefore, we find evidence in support of "the moral hazard of depositos due to government deposit guarante". The Grubn et al (1999 and 2003) framework and the H-statistics both present evidence that monopolistic competition prevalied in the banking sectors in the countries of our study. We also test if there was an approach towards risk taking before and after the crisis of 1997, but we no find evidence to support such behaviour. Therefore, we do not find evidence in support of "the moral hazard of bank managers and owners due to government guarantee" and also no evidence of any link between depositor discipline and bank's risk taking.

Keywords: Depositor Discipline, Bank Risk Taking, Financial Crisis, South Asian Countries

JEL Classification: G01; G21; G28

1. Introduction

The regulatory changes adopted in the developed countries were effective, resultingaction by many developing countries taking steps to liberalize and reform their financial sectors in the 1990s. The reforms of the financial sector had twin objectives: increasing efficiency of the commercial banks, and ensuring the soundness of the financial sector where commercial banks, be they are public or private play a vital role.

[1] Associate Professor, Department of Economics and Finance, College of Business, Dillard University, 2601 Gentilly Blvd., New Orleans, LA 70122. E-mail: mhussain@dillard.edu, ershad710@hotmail.com
[2] Professor, Finance, College of Business Administration, University of New Orleans, New Orleans, Louisiana. E-m**ail:** mhassan@uno.edu
[3] Professor, Finance, Scott College of Business, Indiana State University, Terre Haute, Indiana. E-mail: mahfuzul.haque@indstate.edu

It was believed that such improvement in the banking sector would foster economic growth via the efficient allocation of scarce capital, both for the domestic and the foreign commercial banks in the host countries. In spite of its success, the liberalization policies now face a backlash in many developing countries. Critics cite the cases of international financial crises (Mexican Peso Crises in 1994 and Asian Crises of 1997) and domestic crises (Japan in the late 90's, Turkey during the early 2000's). Their arguments mostly centered on the timing, the haste and the ways such policies were implemented, leading to renewed interest on the issues of 'competition and stability' in the banking sector.

One of the outcomes of liberalization and privatization in the developing countries, it increased competition in the banking sector of the host countries, as documented by Klaus and Chenard (1997). Studies in the financial sector, especially banks, has attracted a wide-spread attention in recent years, and mostly dealt with the impact of competition in the banking sector on i) economic growth; ii) performance of banks; iii) efficiency change of banks; iv) adoption of modern technology by banks; v) stability of commercial banks; vi) the access of firms and households to financial services and external financing; vii) cost of financial intermediation[4]; and vii) changes in the risk-taking behavior of banks. In this study, we focus on the last topic by studying two of the major factors of risk-taking behavior: depositor discipline and degree of competition.

Apart from the recent increase in bank crises and the subsequent academic interest, in June, 2004[5], the Basel Committee and the OECD countries finalized Basel II. The primary focus of Basel II is in risk management, making the changes in risk behavior of banks in response to policy changes more important than before. At the same time, the Committee also decided the "market discipline" be made one of the three pillars on which future financial regulation should be based, as such discipline imposes strong incentives for banks to conduct their business in a safe, sound, and efficient manner and also to hold adequate capital[6]. It is expected to reduce the risk of a bank portfolio[7]. However, there is insignificant empirical evidence to support this issue, and hence our studyto fill that gap.

---

[4]Demirguc-Kunt and Detragiache (2005).
[5] Web-site of Basel Committee on Bank Supervision.
[6] According to the June, 2004 declarations of Basel II Accord, the three pillars include (i) risk-weighted capital ratios; (ii) supervisory oversight; and (iii) market discipline.
[7]Ghosh, Saibal and Abhiman Das (2004).

The objective of this study is to find answers to the following few important questions: (1) what is the state of depositor discipline in the five selected countries during the Asian crisis of 1997? (2)what type of competition exist in the banking sector (competition, monopoly or super-competition)?; (3) does the moral hazard of the implicit and explicit governmental guarantee exit in the banking sector?(did the risk-taking behavior of banks changed before and after the crisis?); and (4) what is the relationship between depositor discipline and bank risk taking behavior? The study covers five South Asian Countries, including Malaysia, Indonesia, Korea, Philippines and Thailand during the Asian Crises to find the answers to these questions. Following,Gruben, Koo and Moore (1999, 2003), our approach to investigate the problem and analyze the changes in risk incentive of banks directly is relatively new approach, and we examine the shifts in bank risk and the factors that make such activity more appealing. We also examine two important hypotheses that deal with the complex and intricate world of decision making for the commercial banks. Despite strong interest and progress in research on some of the issues, research on the developing and the emerging market countries remains lacking. Only the following episodes of crisis have been studied so far: Argentina(1995), Canada (1984-86), Mexico (1994), Singapore(1997-99), Norway(1987-89), and Texas Savings and Loan Associations(1984-90). In this study, we use a newly available dataset to find answers to the questions outlined above to look inside "the black box of bank behavior" during and after a crisis like that of 1997and we believe our findings will add important information to the existing literature.

Following the introduction in section one, the paper is organized as follows: section two presents literature review, section three discusses data and methodology, section four provides analysis and empirical results, and finally section five concludes the study.

2. Literature Review

Saxton (1998), states the conditions promoting perverse (risk-taking) incentives are even more compelling in modern emerging economies than in developed economies. As extant in the literature, most of the studies in this area are concentrated on the determinants of financial or bank crises (Calomiris (1990); Kaminksy and Reinhart (1996); and Demirguc-Kunt and Detragiache (1998, 2005)).

In these studies incentives that lead banks to take on more risks took a back stage, that is, those were not studied directly. Kaminsky et al. (1996), referred to the South American financial problem during 1995 and to the Asian Crises during 1997 as Twin Crises and finds the countries affected by the crises face exchange rate and banking problems simultaneously.

Gruben et al. (1999),points out those two key factors that cause banking panic are: lack of market (depositor) discipline and financial liberalization. In their study on Argentina, Mexico and Canada, they find that lending risk (measured as super-competition stage of banks) increases significantly in the aftermath of liberalization in countries where market discipline is weak. Gruben et al. (2003), study six countries and find evidence that the measure of bank risk increases significantly in the aftermath of liberalization, but only where depositors fail to discipline banks; also that market discipline and bank risk were persistently inversely related. They also find that the Mexican banking system was "super-competitive"; that is, marginal prices were set below marginal costs. This was called "super-competition," where banks are taking risks to capture a larger share of the market today so that tomorrow they can reap the benefits of such hostile expansion.

Demirguc-Kunt et al.(1998, 2005), and Kaminsky et al. (1996), find evidence indicating that risk-taking activities of banks increase in the wake of liberalization, especially in developing countries where financial institutions are underdeveloped and law enforcement and regulatory supervision are weak and inadequate, thus resulting in increased opportunities for excessive risk-taking and fraud.Demirguc-Kunt and Detragiache (1997, 1998, and 2000a), finds evidence that risk-taking activities of banks increase due to the moral hazard problem created by deposit insurance. This shows that explicit deposit insurance reduces depositor discipline, which increases moral hazard. The two factors directly related to stability of banks are market discipline and financial liberalization.

The paper of Martinezand Schmukler (2001),centers on the experiences of Argentina, Chile, and Mexico during the 1980s and 1990s. They find that depositors discipline banks by withdrawing deposits and by requiring higher interest rates. Deposit insurance does not appear to diminish the extent of market discipline. Claessens and Laeven (2004), apply the Panzar and Rosse(1987),method and find systems with greater foreign bank entry and fewer entry and activity restrictions to be more competitive. They find no evidence that competitiveness measure negatively relates to banking system concentration.

Their findings confirm contestability determines effective competition especially by allowing (foreign) bank entry and reducing activity restrictions on banks.Maechler and McDill(2006), paper captures banks' dynamic response to depositor discipline, recognizing that the price and quantity response of uninsured deposits in the face of deteriorating fundamentals needs to be modeled as an endogenous process. They investigate and find that strong banks can raise uninsured deposits by raising their price, while weak banks cannot. Ghosh (2009a), finds that charter value, depositor discipline and bank risk-taking are intertwined, with each tending to reinforce the other. Whereas charter value is found to be a nonlinear determinant of market discipline, the latter is found to positively impact charter value. Additionally, higher risk-taking is found to exert a weakening effect on market discipline. Ghosh (2009b), examines the determinants of banks' charter value and its disciplining effect on bank risk-taking since the mid-1990s. The analysis indicates that deposit and loan market concentration exert a significant effect on charter value, suggestive of a strong link between competition and charter value.

Hori and Murata (2009), paper examines depositors' ability to distinguish healthy banks from problematic banks, a necessary distinction for depositors to impose discipline on banking institutions. They analyzed a large panel of 784 deposit-taking institutions in Japan during the period from 1992 to 2002. Their estimates indicate that depositors rightly appreciated the difference between healthy banks and risky banks, and depositors of larger institutions are more sensitive to the bank risks than those of smaller institutions. Karas, Pyleand Schoors (2010), study uses a database from post-communist, pre-deposit-insurance Russia, and demonstrates the presence of quantity-based sanctioning of weaker banks by both firms and households. Evidence for the standard form of price discipline, however, is weak. This combination of findings is unusual within the context of the literature on market discipline, but it is consistent with depositors interpreting the deposit rate as a complementary proxy of otherwise unobserved bank-level risk.

Angkinand and Wihlborg (2010, a), study how deposit insurance systems and ownership of banks affect the degree of market discipline on banks' risk-taking. An expected U-shaped relationship between explicit deposit insurance coverage and banks' risk-taking is influenced by country specific institutional factors, including bank ownership, whileAngkinand, Sawangngoenyuang and Wihlborg (2010, b), state that several studies indicate that financial liberalization contributes to the likelihood of a financial crisis.

Avery, Terrence and Michael (1988), study assesses the potential for bank subordinated notes and debentures to augment market discipline by examining the sensitivity of the interest-rate spread between bank-related debt and comparable Treasury securities to measures of bank risk. They conclude that the market discipline benefits of subordinated notes and debentures appear to be relatively small. Moreover, even if the bond rating agencies could influence bankers to behave in a particular way, the authors' findings suggest the tempted behavior may not be viewed by regulators as consistent with their standards of safety and soundness.Park and Stavros (1998), studied the price and quantity effect of uninsured deposits in a large panel of thrifts. The authors develop separate models for interest rate and changes in the amount of deposits. The findings of the paper support the presence of market discipline. Riskier thrifts are found to pay higher interest rates and attract smaller amount of uninsured deposits concluding this as an evidence of depositor discipline. Authors also conclude similar findings for the insured insurers, although statistical significance is substantially lower.

Gonzalez (2005), examines the link between bank regulation on bank charter value and risk taking with an innovative framework of two equations. The sample covered the period 1995 to 1999 that included 251 banks from 36 countries. The author found that banks in countries with stricter regulation have a lower charter value, which increases the incentives of banks for higher risk taking activities. On the other hand, deposit insurance has a positive influence on bank charter value, which mitigates the risk shifting incentives that it generates. Kaoru, Hiroko, and Kotaro (2005), studied the effectiveness of market discipline by depositors during the period 1992 to 2002 in four crises hit Asian countries: Indonesia, Korea, Malaysia, and Thailand. Only for Indonesia authors found evidence in support of "the wake-up call hypothesis," which is similar to those of the Latin American countries. However, depositors' risk sensitivity decreased in Korea and Thailand after the crisis.

Soledad and Schmukler (2001), investigates the interaction between market discipline and deposit insurance and the impact of banking crises on market discipline. They emphasis on Argentina, Chile, and Mexico during the 1980s and 1990s. They found evidence in support of depositor discipline in all countries. Depositors discipline banks by withdrawing deposits and by requiring for higher interest rate. They also found evidence that deposit insurance does not diminish the strength of depositor discipline.

Aggregate shocks affect deposits and interest rates during crises, regardless of bank fundamentals, and investors' responsiveness to bank risk taking increases in the aftermath of crises.

Aggregate shocks affect deposits and interest rates during crises, regardless of bank fundamentals, and investors' responsiveness to bank risk taking increases in the aftermath of crises.

3. Data and Methodology

The data used in the study for the bank specific variables come from Bank Scope CD, 2008, and the macro-economic variables come from World Development Indicators, 2008. Data for the time period 1993 to 2007 is collected for commercial banks and we include all commercial banks in the sample; there is no need to use a filter with asset-size. The concerns of exchange rate fluctuations at a time like the Asian Crisis of 1997 does not arise as the data from Bank Scope is yearly and is in current US dollars.

Following Gruben et al. (1999), we test the existence of depositor discipline: do the depositors punish banks by withdrawing deposits when asset quality declines? If so, then the growth rate of deposits (RTDEPGROW) should be negatively related with asset quality (ASSETQUALITY). We set up the following model for this, where the coefficient θ_1 should be negative:

$$RTDEPGROW_{it} = \theta_0 + \theta_1 ASSETQUALITY_{it} + \theta_2 EQTA_{it} + \theta_3 LTA_{it} + \theta_4 TDTL_{it} + \varepsilon_{it} \quad \ldots\ldots(1)$$

The proxies for ASSETQUALITY included here are (a) Ratio of Loan Loss Reserve to Gross Loan (LLRG); (b) Ratio of Loan Loss Provision to Net Internal Reserve (LLLP); (c) Loan Loss Reserve to Impaired Loan (LLRL); and (d) Impaired Loan to Gross Loan (ILGL). These variables are used one after another in equation (1) and so the regression is run four times. If depositor discipline exists, then all of these variables should be negatively related with the dependent variable. Appendix A presents the expected signs on this and all subsequent models (equation 9, 10 and 11).

Equation (1) includes three control variables: i) EQTA: the ratio of equity capital to total assets; ii) LTA: Log of total assets; and iii) TDTL: a deposit configuration variable. Expected signs of the coefficients of EQTA and TDTL are ambiguous and should be empirically examined.

If depositors prefer an adequately capitalized bank to an undercapitalized bank to the extent that they withdraw their fund from the undercapitalized to the adequately capitalized bank, then the EQTA variable will have a positive relationship with deposit growth. However, this needs to be found empirically. A similar implication holds for TDTL. However, for LTA, (the Log of total assets) a 'too big to fail' hypothesis implies that bigger banks should be able to attract more deposit due to a higher confidence of the depositors.

In the next step, we construct the index of competition using the simultaneous equation model that Gruben et al. (2003), introduced. The model tests market power of a commercial banking system by estimating an index of market power (λ). The Gruben et al. (2003), model is very powerful model and can yield multiple estimation results. Based on the value of this coefficient we can detect the type of competition, that is, perfect competition, monopoly and "super-competition." Then we use the model to identify the breaks in competitiveness by applying a dummy variable. To test if the degree of competition has increased following liberalization, that is, whether there is a difference before and after, the dummy variable is set to change value from "zero" before the crisis of 1997 to "one" after the 1997.

The index of market power (λ) captures the difference between a firm's perceived marginal revenue schedule and the firm's demand schedule. Under competitive conditions, marginal cost can be set equal to perceived marginal revenue. If the firm's perceived marginal revenue schedule and the firm's demand schedule are identical, then setting marginal cost equal to perceived marginal revenue is the same as setting marginal cost equal to demand price, which is the condition of perfect competition. But if firms act in collusion, such as, duopoly or to the extreme monopoly, then they set marginal cost equal to perceived marginal revenue that corresponds to the industry's marginal revenue curve.

A demand function for commercial bank services is written as follows:

$$Q = D(P, Y, \alpha) + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where Q is quantity, P is price, Y is a vector of exogenous variables, α is a vector of demand equation parameters to be estimated, and ε is a random error term.

Actual (as distinguish from perceived) marginal revenue[8] is:

$$MR = P + h(Q,Y,\alpha),\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

$$= P + Q/(\partial Q/\partial P)$$

The function $h(Q,Y,\alpha)$ is the inverse of the semi-elasticity of demand[9], and $h(*)\leq 0$. A firm's perceived marginal revenue is:

$$MR^P = P + \lambda h(Q,Y,\alpha)\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Where λ is a new parameter to be estimated, $0\leq\lambda\leq 1$. Here, λ measures the degree towhich firms recognize the distinction between demand and marginal revenue functions.Let c (Q, W, β) be the average firm's marginal cost function, where W is a vector ofexogenous supply side variables and β is a vector of supply side parameters to beestimated. Maximizing firms will set perceived marginal revenue equal to marginal cost. We include a random error term to denote discrepancies:

$$P = c(Q,W,\beta) - \lambda h(Q,Y,\alpha) + \eta \ldots\ldots\ldots \ldots(5)$$

If firms act as price takers so that they do not perceive a difference between theirmarginal revenue functions and demand functions, then λ=0. If firms act as a jointmonopoly (λ=1), clearly perceiving a difference between their demand and marginalrevenue functions, they set output where marginal cost equals marginal revenue.Intermediate values of λ correspond to other oligopoly solution concepts. A Cournotequilibrium is suggested when λ = 1/n.

---

[8] $TR = P.Q \Rightarrow \partial TR/\partial Q = MR = P.\partial Q/\partial Q + Q.\partial P/\partial Q = P. + Q.\partial P/\partial Q$

[9] $$MR = P + Q/(\partial Q/\partial P) = P + \frac{1}{\left(\partial Q/\partial P\right)/Q} = P + \frac{1}{\frac{\partial Q}{Q}\cdot\frac{1}{\partial P}} = P + \frac{1}{\frac{\partial Q}{Q}\Big/\frac{\partial P}{1}}$$

To estimate λ, it is necessary to estimate simultaneously specifications of both (2)and (5), treating P and Q as endogenous variables. The demand function in equation (2) can be specified as:

$$Q = \alpha_0 + \alpha_1 P + \alpha_2 Y + \alpha_3 PZ + \alpha_4 Z + \alpha_5 PY + \alpha_6 YZ + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where Q is output quantity, P is output price, Y is a measure of macroeconomic activity,assumed to be an exogenous variable, and Z is the price of a substitute for bank output,also assumed to be exogenous. The interaction terms, the products PZ, PY and YZ, arenecessary to permit rotation of the demand curve as required to identify λ.

Following the model of Gruben et al. (2003), a cost function is used to estimate theaverage commercial bank's cost function as follows:

$$\ln C = \gamma_0 + \gamma_1 \ln Q + \gamma_2 (\ln Q)^2 + \gamma_3 \ln W_1 + \gamma_4 \ln W_2 + \gamma_5 \ln(W_1)^2 / 2 + \gamma_6 \ln(W_2)^2 / 2$$

$$+ \gamma_7 \ln W_1 \ln W_2 + \gamma_8 \ln Q \ln W_1 + \gamma_9 \ln Q \ln W_2 \ldots\ldots (7)$$

Where C is total cost, W1 and W2 are exogenous input prices, as explained below. Equation (7) gives rise to the following marginal cost function, c (Q, W, β)

$$MC = (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) + \eta \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Therefore, equation (5) can be expressed as follows:

$$P = -\lambda Q/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) + \xi \ldots\ldots (9)$$

Based on this equation, in the first step, the value of –λ represents a typical bank's percentage deviation of output from competitive level. Thus, –λ is less than zero, implies that output is below the competitive levels. If λ is zero, it implies that output is at the competitive level. Finally, –λ greater than zero implies that output exceeds that of competitive levels. This is called "super-competition". This means that banks are operating at a point where marginal cost is larger than perceived marginal benefit.

However, equation (9) is not configured to facilitate analysis of breaks in bank behavior. To allow for breaks, we rely on the following specification of (6):

$$P = -\lambda Q/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) \quad (10)$$
$$- \beta_5 DQ/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + \xi$$

Where D is a dummy variable to be more fully explained below and ξ is a random error term. The system of equation represented by (6) and (10) is then estimated simultaneously with 3SLS.

The difference of competition between the two periods is reflected in the coefficient on the dummy variable β_5 . Before the liberalization date the index of market power will be λ, but afterwards it will be λ+ β_5 . Thus, β_5 shows the difference between the levels of competition between the two periods. If we find that the value of β_5 is positive and large, that will imply that banks significantly increased the riskiness of their behavior after liberalization or privatization.

We use the Gruben-framework mentioned in the preceding paragraph, to examine "the moral hazard of bank managers and owners due do implicit and explicit government guarantee programs". When the government gives guarantee to banks, such guarantee may create incentive for bank managers and owners to take more risk. After all, with the government in the picture, the managers and owners may feel that if they make more money by taking more risk, then do not have to share the gain with anyone. But if they fail, then the government will be there to help the banks. If this "moral hazard of bank managers and owners due to government guarantee" is true, then we should find a positive and significant coefficient of β_5 . But if we do not find such a significant coefficient, which will mean the behavior of banks managers and owners did not change much as a result of the guarantee given due to the crisis. This will show that bank managers and owners refrain from opportunistic behavior as claimed by the supporters of the hypothesis.

Gruben et al. (2003), examined the relationship between depositor discipline and the structural break in the direction of super-competitiveness with the help of graphical representations. In the first representation, t-statistics associated with the

ASSETQUALITY proxy ratio were plotted on the horizontal axis against the index of competition (coefficient β_5 in equation 10) on the vertical axis. In the next graph, t-statistics associated with the ASSETQUALITY proxy ratio were plotted on the horizontal axis against the t-statistics of the same index of competition (coefficient β_5 in equation 10) on the vertical axis. Graphs are not reported. The Panzer and Rosse (1982, 1987), (henceforth PR) approach is used to assess the competitive nature of banking industries for the period 1993 to 2007. The PR H-statistic, which will be our index of competition, is calculated from reduced form bank revenue equations. It measures the sum of the elasticity of the total revenue of the banks with respect to the bank's input prices. The PR H-statistic is adopted from Claessens et al. (2004), and its values and interpretations are presented in Table A below[10].

Table A: PR H-Statistics

Value of PR H-statistics	Decision
H<0	Monopoly
H=1	Perfect Competition
0<H<1	Monopolistic Competition

Again in line with Claessens et al. (2004), the following reduced-form revenue equation is estimated on pooled samples for each country to derive the H-statistics

$$\ln(P_{it}) = \alpha + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,it}) + \beta_3 \ln(W_{3,it}) +$$

$$\gamma_1 \ln(Y_{1,it}) + \gamma_2 \ln(Y_{2,it}) + \gamma_3 \ln(Y_{3,it}) + \varepsilon_{it} \quad \ldots\ldots\ldots \quad (11)$$

Here, P_{it} is the ratio of gross interest revenue to total assets (proxy for output price of loans), $W_{1,it}$ is the ratio of interest expense to total deposits and money market funding (proxy for input price of deposits), $W_{2,it}$ is the ratio of personnel expense to total assets (proxy for input price of labor), and $W_{3,it}$ is the ratio of other operating and administrative expense to total assets (proxy for input price of equipment / fixed capital).

[10]These values and interpretation assume that the tests are undertaken on observations that are in long-run equilibrium.

The subscript i and t denote banks and year, respectively. Three control variables are also included in the model, where $Y_{1,it}$, which is the ratio of equity to total assets, $Y_{2,\,it}$ is the ratio of net loans to total assets, and $Y_{3,it}$ is the logarithm of total assets (to control for potential size effect).

4. Empirical Results

Table 1 presents the list of variables used for the three different models in the study. Panel A of the table, shows the variables for the Depositor-Discipline Model. Panel B shows the Gruben Competition Model. Finally, Panel C shows the variable descriptions of the H-statistics model.

Table 1: List of Variables Used in the Study

Panel A: Depositor-Discipline Model

Variable	EQTA	LTA	TDTL	LLRG	LLRP	ILGL	LLRL	DEP_GROW	DEP_TA
Variable Description	Total Equity to Total Assets Ratio	Log of Total Assets	Total Deposit to Total Liability Ratio	Loan Loss Reserve to Gross Loans	Loan Loss Reserve to Net Internal Reserve	Impaired Loan to Gross Loan	Loan Loss Reserve to Impaired Loan	Growth Rate of Total Deposit per Year	Total Deposit to Total Assets Ratio

Panel B: Gruben Competition Model

Variable	Q	Y	Z1	P	W1	C	W2	C_Q	LNQ_C_Q	LNW1_C_Q	LNW2_C_Q
Variable Description	Total Deposit	Total GDP	Market Capitalization of Listed Companies	Interest Rate	Total Personnel Expense	Total Expense	Total Operating Expense	Total Expense to Total Deposit Ratio	Log of Q Multiplied by C_Q	Log of W1 Multiplied by C_Q	Log of W2 Multiplied by C_Q

Panel C: H Statistics Model

Variable	logP	logW1	logW2	logW3	logY1	logY2	log Y3
Variable Description	Ratio of Gross Investment Revenue to Total Assets	Ratio of Interest Expense to Total Deposits and Money Market Funding	Ratio of Personnel Expense to Total Assets	Ratio of Other Operating and Administrative Expense to Total Assets	Ratio of Equity to Total Assets	Ratio of Net Loans to Total Assets	Total Assets

Table 2.A shows the summary statistics of the variables used in each of the three models. Each of the cells shows the number of variables, mean and the standard deviation. Table 2.B shows the correlation coefficients among the variables.

Table 2.A: Summary Statistics

Panel A.I		Panel B.I		Panel C.I	
Depositor-Discipline Model		Gruben Model		H Statistics Model	
EQTA	5179 15.69 41.72	Q	3018 10.2 22.2	logP	3102 -2.9 0.77
LTA	5179 14.29 2.01	Y	5866 214 197	logW1	3224 -2.82 0.76
TDTL	4992 82.81 20.51	Z1	5866 74.31 66.19	logW2	3037 -4 0.78
LLRG	4496 6.94 9.71	P	2991 10.3 43.96	logW3	1862 -4.49 0.74
LLRP	4269 29.61 114.32	W1	2988 7.32 44	logY1	3183 -1.72 0.96
ILGL	2754 12.81 14.57	C	2998 790.52 1658.17	logY2	3238 -0.39 0.7
LLRL	2699 82.2 84.12	W2	2823 1.09 0.72	logY3	3267 14.56 1.94
DEP_GROW	4245 -3.02 98.25	PZ1	2991 799.12 6156.44		
DEP_TA	4992 71.85 21.77	YZ1	5866 13.5 16.5		
		Y1Z1	5866 135.17 165.69		

Note: Each cell has three entries. The top entry shows the number of observations. The middle one show mean of the variable. Finally, the last entry shows standard deviation.

Table 2.B
Correlation Coefficient

Panel A.II: Depositor-Discipline Model

	EQTA	LTA	TDTL	LLRG	LLRP	ILGL	LLRL	DEP_GROW	DEP_TA
EQTA	1								
LTA	-0.43	1							
TDTL	-0.08	-0.1	1						
LLRG	0.05	-0.25	-0.08	1					
LLRP	-0.06	0.03	-0.01	0.09	1				
ILGL	-0.02	-0.22	0.03	0.73	0.16	1			
LLRL	0.04	-0.03	-0.09	0.06	-0.1	-0.3	1		
DEP_GROW	-0.11	0.07	0.14	-0.21	-0.01	-0.09	-0.01	1	
DEP_TA	-0.57	0.15	0.85	-0.09	0.03	0.03	-0.1	0.14	1

Panel B.II: Gruben Model

	Q	Y	Z1	P	W1	C	W2	C_Q
Q	1							
Y	0.61	1						
Z1	0.02	-0.19	1					
P	-0.04	-0.03	0.01	1				
W1	-0.03	-0.03	0.02	1	1			
C	-0.04	-0.04	-0.01	0.98	0.99	1		
W2	-0.15	-0.05	-0.23	-0.02	-0.04	0	1	
C_Q	-0.08	-0.08	-0.1	0.27	0.25	0.31	0.38	1

Panel C.II: H Statistics Model

	logP	logW1	logW2	logW3	logY1	logY2	logY3
logP	1						
logW1	0.27	1					
logW2	0.70	0.19	1				
logW3	0.33	0.30	0.48	1			
logY1	0.73	0.06	0.54	0.03	1		
logY2	-0.54	0.18	-0.59	-0.01	-0.53	1	
logY3	-0.41	-0.40	-0.27	-0.24	-0.46	-0.03	1

Table 3. Panels A and B reports OLS regression results for equation 1(the depositor discipline model). We estimate the regression with data for each country separately. We wanted to examine if the depositors withdrew their deposits when asset quality of banks declines.

In order to examine more information, we alternatively tested with two different dependent variables: (i) deposit growth rate; and (ii) total deposit divided by total assets We present the results for total deposit over total assets; for the sake of brevity, we do not present the rest of the results here (available upon request). On the dependent variable side, we tested with four alternative definitions of asset quality: namely (i) ratio of loan loss reserve to gross loan (LLRG) presented in panel a; (ii) ratio of loan loss provision to net internal reserve (LLLP) – panel b; (iii) ratio of impaired loan to gross loan (ILGL) - panel c; and (iv) ratio of loan loss reserve to impaired loan (LLRL) – panel d. In total, four sets of regressions were run on equation 1 for each of the five countries. Most of the asset quality proxies have insignificant coefficients, and even when they are significant, the coefficients are extremely low or close to zero. As a result, we conclude that total deposits scaled by total assets are probably not related to changes in asset quality. Overall, we find that the state of depositor discipline is extremely weak. Why are the depositors not withdrawing their deposits, when asset quality of banks is falling?

We find the answer in "the moral hazard problem of depositors due to government guarantee (explicit or implicit)" hypothesis. This hypothesis states that when the depositors find out that their deposits in the banks are protected by the government;they lose the incentive to monitor banks' asset quality or to make changes to deposits when quality of assets decline. As a result, the financial market loses one of its most potent market force "depositor disciplines."This can be supported by the findings of Mondschean and Opiela (1998), in case of Poland, wherethey found that use of explicit deposit guarantees starting in late 1994 also had a similar effect on market discipline; i.e., introduction of the deposit guarantee schemes weakened depositor discipline. This is clear evidence of moral hazard problem of depositorsdue to government guarantee. Because of the guarantee given by the government on deposits, depositors lose the incentive to monitor banks. Imai (2005), found that when the Japanese government lifted a blanket guarantee on April 1, 2002, the sensitivity of interest rates on deposits increased, implying enhanced depositor discipline. Loannidou and Dreu (2005), found similar evidence in the case of Bolivia from 1998 to 2003. Martinez et al. (2001), studied depositor discipline in Argentina, Mexico and Chile during the 1980s and 1990s and found evidence, which proved that depositor discipline exists. But in this study, we do not find such strong evidence.

Table 3.A: Depositor-Discipline Model (Loan Loss Reserve to Impaired Loan-LLRL)

Estimates of equation 1 are reproduced below. The focus is on the coefficients of the proxies for asset quality. Four alternate proxies are used, for example, LLRL, LLRG, LLRP, and ILGL. Panel A shows Total Deposit over Total Assets Ratio as a dependent variable. Panel B shows Growth Rate of Total Deposit as a dependent variable. If depositor discipline exists, then ASSETQUALITY should be inversely related to both dependent variables. Banks should be punished for allowing ASSSETQUALITY to go down.

$$DEP\_VAR_{it} = \theta_0 + \theta_1 ASSETQUALITY_{it} + \theta_2 EQTA_{it} + \theta_3 LTA_{it} + \theta_4 TDTL_{it} + \varepsilon_{it} \ldots\ldots\ldots(i)$$

Variables	Indonesia	Korea	Malaysia	Philippines	Thailand	Indonesia	Korea	Malaysia	Philippines	Thailand
	Depositor-Discipline Model (Loan Loss Reserve to Impaired Loan-LLRL)					Asset Quality is measured with Loan Loss Reserve to Gross Loan-LLRG.				
	Panel A: Total Deposit Over Total Assets Ratio as a Dependent Variable					Panel A: Total Deposit Over Total Assets Ratio as a Dependent Variable				
LLRL	-0.011 -0.355	-0.245 (0.000)***	0.044 (0.000)***	0.117 (0.000)***	0.004 -0.859	-0.011 -0.355	-0.245 (0 .000)***	0.044 (0 .000)***	0.117 (0 .000)***	0.004 -0.859
EQTA	-0.637 (0.000)***	-0.416 (0.000)***	-0.761 (0.000)***	-0.668 (0.000)***	-0.598 (0.000)***	-0.637 (0.000)***	-0.416 (0 .000)***	-0.761 (0 .000)***	-0.668 (0 .000)***	-0.598 (0 .000)***
LTA	0.341 (0.000)***	0.723 (0.000)***	0.145 (0.032)**	0.604 (0.000)***	0.524 (0.000)***	0.341 (0 .000)***	0.723 (0 .000)***	0.145 (0 .000)***	0.604 (0 .000)***	0.524 (0.000)***
TDTL	0.871 (0.000)***	0.87 (0.000)***	0.641 (0.000)***	0.825 (0.000)***	0.779 (0.000)***	0.871 (0.000)***	0.87 (0.000)***	0.641 (0.000)***	0.825 (0.000)***	0.779 (0.000)***
CONS	4.09 (0.002)***	-3.564 (0.067)*	28.669 (0.000)***	3.042 (0.069)*	8.729 (0.000)***	4.09 (0.002)***	-3.564 (0.067)*	28.669 (0.000)***	3.042 (0.069)*	8.729 (0.000)***
Panel B: Growth Rate of Total Deposit as a Dependent Variable						Panel B: Growth Rate of Total Deposit as a Dependent Variable				
LLRL	0.001 (0.000)***	0.001 -0.658	0.001 -0.545	-0.003 -0.201	0.001 -0.523	1.015 (0.120)*	0.014 -0.496	0 -0.975	-0.121 (0.000)***	0.006 -0.489
EQTA	-0.025 (0.000)***	0.003 -0.69	0.004 -0.166	-0.038 (0.046)**	-0.003 -0.147	-0.507 -0.317	0.004 -0.768	0.006 -0.4	-0.013 -0.333	-0.007 -0.3

		5						94		
LTA	0.043 (0.004)***	0.057 -0.272	0.061 (0.000)***	0.134 -0.204	0.017 -0.216	7.528 (0.095)*	0.225 (0.012)**	0.144 (0.019)**	0.1 -0.218	0.056 -0.301
TDTL	0.016 (0.000)***	0.025 (0.000)***	0.003 (0.002)***	0.05 (0.000)***	0 -0.972	1.612 (0.000)***	0.006 -0.383	0.056 (0.000)***	0.031 (0.000)***	0.004 -0.307
CONS	-1.861 (0.000)***	-2.966 (0.000)***	-1.267 (0.000)***	-5.603 (0.006)***	-0.216 -0.357	-246.25 (0.000)***	-4.409 (0.011)**	-7.314 (0.000)***	-3.131 (0.043)**	-1.261 -0.175

Note: '***' significant at the 1 percent level; '**' significant at the 5 percent level; and '*' significant at the 10 percent level.
The top entry in each cell shows the value of the coefficient being estimated and the bottom entry shows the p-value.

Table 3.B continued

Estimates of equation 1 are reproduced below. The focus is on the coefficients of the proxies for asset quality. Four alternate proxies are used, for example, LLRL, LLRG, LLRP, and ILGL. Panel A shows Total Deposit over Total Assets Ratio as a dependent variable. Panel B shows Growth Rate of Total Deposit as a dependent variable. If depositor discipline exists, then ASSETQUALITY should be inversely related to both dependent variables. Banks should be punished for allowing ASSSETQUALITY to go down.

$$DEP\_VAR_{it} = \theta_0 + \theta_1 ASSETQUALITY_{it} + \theta_2 EQTA_{it} + \theta_3 LTA_{it} + \theta_4 TDTL_{it} + \varepsilon_{it} \ldots\ldots\ldots (i)$$

Variables	Indonesia	Korea	Malaysia	Philippines	Thailand	Indonesia	Korea	Malaysia	Philippines	Thailand
	Asset Quality is measured with Loan Loss Reserve to Net Internal Reserve-LLRP.					Asset Quality is measured with Impaired Loan to Gross Loan-ILGL.				

	Panel A: Total Deposit Over Total Assets Ratio as a Dependent Variable					Panel A: Total Deposit Over Total Assets Ratio as a Dependent Variable				
LLRL	-0.001 -0.333	-0.002 -0.126	0.001 (0.079)*	0.001 -0.554	0.011 -0.727	0.002 -0.85	-0.04 (0.005)***	0.007 -0.16	0.019 (0.004)***	-0.003 -0.816
EQTA	-0.619 (0.000)***	-0.56 (0.000)***	-0.758 (0.000)***	-0.627 (0.000)***	-0.651 (0.000)***	-0.709 (0.000)***	-0.767 (0.000)***	-0.728 (0.000)***	-0.81 (0.000)***	-0.679 (0.000)***
LTA	0.37	0.545	0.125	0.384	0.385	0.293	-0.465	0.062	0.182	0.245

	(0.000)***	(0.000)***	(0.071)*	(0.000)***	(0.011)**	(0.013)**	(0.000)***	-0.3	(0.007)***	(0.063)*
TDTL	0.879 (0.000)***	0.851 (0.000)***	0.664 (0.000)***	0.746 (0.000)***	0.76 (0.000)***	0.9 (0.000)***	0.856 (0.000)***	0.718 (0.000)***	0.819 (0.000)***	0.8 (0.000)***
CONS	2.751 (0.021)**	1.329 -0.516	27.057 (0.000)***	13.436 (0.000)***	12.926 (0.000)***	2.935 -0.124	19.97 (0.000)***	22.936 (0.000)***	12.184 (0.000)***	12.057 (0.000)***
Panel B: Growth Rate of Total Deposit as a Dependent Variable						Panel B: Growth Rate of Total Deposit as a Dependent Variable				
LLRL	0.024 -0.602	0 -0.952	0 -0.74	0.001 -0.477	0 -0.746	-0.018 (0.000)***	-0.003 -0.231	-0.008 (0.000)***	-0.027 (0.000)***	-0.002 (0.042)**
EQTA	-0.334 -0.351	0.012 -0.475	-0.001 -0.902	-0.005 -0.693	-0.003 -0.669	-0.006 -0.361	0.005 (0.058) *	-0.026 (0.000)***	-0.03 (0.09)*	-0.003 -0.148
LTA	2.391 -0.451	0.231 (0.026)**	0.09 -0.12	0.194 (0.024)**	0.071 -0.205	0.012 -0.817	0.057 (0.000)***	0.014 -0.426	0.152 -0.142	0.016 -0.231
TDTL	0.854 (0.000)***	0.008 -0.295	0.039 (0.000)***	0.042 (0.000)***	0.005 -0.173	0.02 (0.000)***	0.003 (0.000)***	0.029 (0.000)***	0.053 (0.000)***	0.011 -0.659
CONS	-106.527 (0.019)**	-4.737 (0.02)**	-4.887 (0.000)***	-6.405 (0.000)***	-1.598 (0.091)*	-1.588 (0.077)*	-1.18 (0.000)***	-2.492 (0.000)***	-6.004 (0.000)***	-0.193 -0.402

Note: '***' significant at the 1 percent level; '**' significant at the 5 percent level; and '*' significant at the 10 percent level. The top entry in each cell shows the value of the coefficient being estimated and the bottom entry shows the p-value.

Table 4 presents estimates based on simultaneous estimation of the Gruben et al. (1997, 1999, and 2003),model given in equations 6 and 10. The two equations system was estimated for each country separately. We know that this model will give us answers to three questions: one, what type of competition exists in the banking sector of these countries? two, is there a 'super-competition' in the banking sector? and three, is there a break in banks' risk taking behavior before and after 1997?All of the lambda coefficients in the five countries aresignificant and negative except the one for Malaysia (it is significant and positive). Therefore,the banking sectors of Thailand, Indonesia, Korea, and Philippines show monopolistic competition.

[

In case of Malaysia alone we find evidence of "super-competition." (These are answers to the first and second questions?).

Next we compare the risk-taking behavior of banks before and after 1997(the third question?). This is test of the "moral hazard of bank managers and owners due to government implicit and explicit guarantees" hypothesis. According to this hypothesis, bank managers and owners may try to take more risk when they find out that the government will help them in case of financial trouble. If this is true, then we should find a break in risk-taking before and after the crisis since government guarantee is only available after the crisis and not before. The bank managers and owners may become greedy and start taking risk that they would not take otherwise. In our estimates, the beta-5 coefficients (in the equation 6 and 10 framework) are statistically insignificant in Indonesia, Korea, and Malaysia. This indicatesthat there was no change in competitive behavior of banks before and after 1997 in. The Thailand and Philippines had coefficients that were significant.In Thailand (the coefficient is negative indicating that risk-taking has decreased) and in Philippines (the coefficient is positive indicating that risk-taking has increased). Therefore, we find evidence in support of moral hazard hypothesisin Philippines alone.

Table 4: Gruben Competition Model: One-year Break

As mentioned in the text, LAMBDA (equation 1.10) is the index of com adopted from Gruben et al. (1997, 1998, and 2003). YDUM1_XXTH (last rov dummy variable to test the structural break at 1996. Observations for 19 removed from the sample first, and then the regression was run.

$$Q = \alpha_0 + \alpha_1 P + \alpha_2 Y + \alpha_3 PZ + \alpha_4 Z + \alpha_5 PY + \alpha_6 YZ + \varepsilon \text{ ....(vi)}$$

$$P = -\lambda Q/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) - \beta_5 DQ/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + \xi \text{.....(x)}$$

	Thailand	Indonesia	Korea	Malaysia	Philippines
Panel A: Demand Equation					
P	313206.9 -0.81	293294.2 -0.01	3005.14 -0.95	3005.14 -0.95	974767.9 (0.001)***
Y1	493.82 -0.76	82.17 -0.46	1759.28 -0.01	1759.28 (0.008)***	1193.62 (0.005)***
Z1	-80373.76 (0.671)***	220134.3 -0.01	40594.32 -0.26	40594.32 -0.26	-7478.03 -0.874
PZ1	702.75 -0.95	-16286.67 (0)***	84.26 -0.85	84.26 -0.85	-780.94 -0.76
PY1	-37.82 (0.725)***	5.35 -0.3	-1.94 (0.407)***	-1.94 -0.41	-141.04 (0.000)***

Y1Z1	5.57 -0.72	-1.25 (0.587)***	-5 (0.195)***	-5 -0.2	2.05 -0.69
CONS	4086201 -0.83	-4081873 (0.1)***	-9840346 (0.125)***	-9840346 -0.13	-6594637 (0.074)*
Panel B: Price Equation					
Q_XXTH	-0.007 (0.000)***	-0.456 (0.000)***	-0.362 (0.000)***	0.066 (0.005)***	-0.007 (0.003)***
LNQ_C_Q	18421.08 (0.000)***	10979.84 (0.000)***	-97265.34 (0.000)***	83933.56 (0.000)***	6667.409 (0.000)***
LNW1_C_Q	54516.62 (0.000)***	-14402.22 (0.000)***	1601292 (0.000)***	-226929.5 (0.000)***	5465.237 (0.021)**
LNW2_C_Q	-70283.96 (0.000)***	-55610.94 (0.000)***	257891.4 -0.139	-824136.3 (0.000)***	-25368.84 (0.000)***
YDUM1_XXTH	-0.01 (0.001)***	0.001 -0.763	0.001 -0.174	0 -0.388	0.011 (0.099)*

Note: '***' significant at the 1 percent level; '**' significant at the 5 percent level;
and '*' significant at the 10 percent level. The top entry in each cell shows the value
of the coefficient being estimated and the bottom entry shows the p-value.

In Table 5, we present the second version of the Gruben et al. (2003) model with a three year break(a three year window), that is, we remove three years, namely, 1996, 1997 and 1998 from the data set and then re-run the regressions. Results of lambda-coefficients are similar to those of Table 4 with some difference for Malaysia and Philippines. In Table 5, we find thatmonopolistic competition existed in the banking sector of Thailand, Korea, Indonesia, and the Philippines. But we do not find evidence of "super-competition" in Malaysia as we found in Table 4.We find that risk taking did not change in Indonesia, Korea, and Malaysia (the beta-5 coefficient). But risk taking decreased in both Thailand and Philippines. Philippines show different result for Table 4(beta-5 is positive and significant) and in Table 5(beta-5 is negative and significant). Thus in Table 5, we find evidence against the hypothesis of"the moral hazard of bank managers and owners due to government guarantee."

Table 5: Gruben Competition Model: Three-year Break (Continued)

	Thailand	Indonesia	Korea	Malaysia	Philippines
Panel A: Demand Equation					
P	1498166 -0.422	45957.42 -0.861	-11600000 (0.037)**	2620.03 -0.955	1368122 (0)***
Y1	-271.692 -0.877	-29.052 -0.847	1273.3 -0.212	1699.053 (0.076)*	1346.359 (0.003)***
Z1	-423750 -0.141	226040.9 (0.015)**	-1988662 (0.086)*	37954.89 -0.442	25832.72 -0.632
PZ1	13454.2 -0.298	-15425.67 (0.005)***	269370.9 (0.043)**	90.333 -0.853	-5243.121 -0.118
PY1	-198.66 -0.157	14.645 -0.118	-30.975 -0.829	-1.977 -0.427	-165.139 (0.000)***
Y1Z1	27.721 -0.21	-1.105 -0.671	2.987 -0.58	-4.611 -0.41	1.731 -0.753
CONS	17200000 -0.422	-1559770 -0.674	55900000 -0.243	-9437392 -0.29	-9156827 (0.022)**
Panel B: Price Equation					
Q_XXTH	-0.006 (0 .000)***	-0.398 (0.000)***	-0.343 (0.000)***	0.044 -0.14	-0.007 (0.000)***
LNQ_C_Q	29650.33 (0.000)***	14403.33 (0.000)***	-61413.4 (0.015)**	90186.61 (0.000)***	5526.756 (0.000)***
LNW1_C_Q	91804.8 (0.000)***	-21936.17 (0.000)***	1112509 (0.000)***	-231879.1 (0.000)***	4058.503 (0.037)**
LNW2_C_Q	-117161.9 (0.000)***	-79062.46 (0.000)***	147869.7 -0.425	-794677.4 (0.000)***	-19988.56 (0.000)***
YDUM1_XXTH	-0.008 (0.002)***	0.002 -0.454	0.001 -0.263	0 -0.466	-0.168 (0.000)***

Note: '***' significant at the 1percent level; '**' significant at the 5 percent level; and '*' significant at the 10 percent level. The top entry in each cell shows the value of the coefficient being estimated and the bottom entry shows the p-value.

Table 6 shows the estimates of H-statistics in the commercial banks from 1993 to 2007. The H-statistics model calculates competition as the sum of input elasticity The absolute values of all of the estimated coefficients were less than one but more than zero, which implies that monopolistic competition prevails in the banking sector of these countries. The Gruben et al. (2003), model calculates competition in the banking sector with the help of the demand and cost functions. In this approach the state of competition is measured with the help of divergence between firms' perceived marginal revenue and demand curve. In spite of all the differences in the set-up of two approaches, the H-statistics and the Gruben-framework give us the same result.

Table 6: H Statistics by Year

This is the estimate of the H statistics given in equation xi.

$$\ln(P_{it}) = \alpha + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,it}) + \beta_3 \ln(W_{3,it}) + \gamma_1 \ln(Y_{1,it}) + \gamma_2 \ln(Y_{2,it}) + \gamma_3 \ln(Y_{3,it}) + \varepsilon \ldots\ldots\ldots (xi)$$

Here, the dependent variable

P_{it} is the ratio of the gross interest revenue to total assets (the proxy for the output price of loans). The independent variables are as follows:

$W_{1,it}$ is the ratio of interest expense to total deposits and money market funding (proxy for the input price of deposits),

$W_{2,it}$ is the ratio of personnel expense to total assets (proxy for input price of labor),

$W_{3,it}$ is the ratio of other operating and administrative expense to total assets (proxy for input price of equipment, fixed capital etc).

Three control variables are also included in the model:

$Y_{1,it}$ is the ratio of equity to total assets,

$Y_{2,it}$ is the ratio of net loans to total assets, and

$Y_{3,it}$ is the logarithm of total assets (to control for potential size effect). All variables are in natural log form.

Year	Malaysia	Indonesia	Thailand	Korea	Philippines
1993	0.773	0.424	-0.716	1.032	1.362
1994	0.857	0.633	0.79	0.167	0.588
1995	0.755	0.452	-2.028	0.063	0.218
1996	1.052	0.482	-0.809	0.135	0.443
1997	0.544	0.285	1.08	-0.038	0.346
1998	1.022	0.648	-1.179	0.955	0.026
1999	0.682	-0.178	0.975	-1.185	0.286
2000	0.248	0.463	2.668	-0.486	-0.805
2001	0.196	-0.734	0.904	0.642	-0.467
2002	0.424	0.172	0.995	1.604	-0.915
2003	0.071	0.156	2.09	2.099	-0.504
2004	0.229	0.405	1.572	0.953	-0.252
2005	0.008	0.095	0.883	0.171	0.108
2006	0.322	0.427	0.758	0.58	0.372
2007	0.5	0.475	0.511	-0.199	0.688

In Table 7, we test the impact of depositor discipline on competition. Here we combine the index of competitionfrom Table 4 and 5 (presented in panel A of Table 7) with the index of depositor discipline from Table 3 (presented in panel b – coefficient of proxy for asset quality).Depositor discipline should be strongest during crisis. As a result, if depositor discipline has any impact on competition, we have a higher chance of detecting it during the crisis of 1997.

Several alternative plots/graphs are tested (findings are not reported), but results do not show any definite relationship between two indexes. Even after the crisis, depositor discipline has not grown strong enough to affect banks' risk-taking behavior. Therefore, in order to have a strong link between discipline and risk-taking in banks, we need to have strong discipline first. As more and more countries around the world open up their financial sector and liberalize the banking sector, the need for such discipline will gradually become important. Future stability of the financial system and the progress of the global economy depend on itcritically. Our findings in this paper show that there is an urgent need for improvement in this area.

Table 7: Gruben Competition Model and Depositor-Deposit Model Combined

The two models are combined in this table. Graphs of the two indices were put together to see if we find any association. Unfortunately, no such conclusions could be made.

	Indonesia	Korea	Malaysia	Philippines	Thailand
Panel A: Gruben Competition Model					
Q_XXTH*	-0.456 (0.000)***	-0.362 (0.000)***	0.066 (0.005)***	-0.007 (0.003)***	-0.007 (0.000)***
Q_XXTH**	-0.398 (0.000)***	-0.343 (0.000)***	0.044 -0.14	-0.007 (0.000)***	-0.006 (0.000)***
Panel B: Depositor-Deposit Model					
LLRL	-0.245 (0.000)***	0.044 (0.000)***	0.117 (0.000)***	0.004 -0.859	-0.011 -0.355
LLRG	-0.245 (0.000)***	0.044 (0.000)***	0.117 (0.000)***	0.004 -0.859	-0.011 -0.355
LLRP	-0.002 -0.126	0.001 (0.079) *	0.001 -0.554	0 -0.727	-0.001 -0.333
ILGL	-0.04 (0.005)***	0.007 -0.16	0.019 (0.004) ***	-0.003 -0.816	0.002 -0.85

Note: *one-year-break model from Table 4, **three-year break model from Table 5

Note: '***' significant at the 1 percent level; '**' significant at the 5 percent level; and '*' significant at the 10 percent level. The top entry in each cell shows the value of the coefficient being estimated and the bottom entry shows the p-value.

5. Conclusion

We find evidence that depositors do not monitor banks strictly (weak state of depositor discipline) when their deposits are guaranteed by the government either explicitly or implicitly. Therefore, we find evidence in support of "the moral hazard of depositos due to government deposit guarante". The Gruben et al. (1999, 2003), framework and the H-statistics both present evidence that monopolistic competition prevalied in the banking sectors in the countries of our study. We also test if there was an approach towards risk taking before and after the crisis of 1997, but we no find evidence to support such behaviour. Therefore, we do not find evidence in support of "the moral hazard of bank managers and owners due to government guarantee" and also no evidence of any link between depositor discipline and bank's risk taking.

References

Angkinand, A. and Wihlborg, C. (2010a). Deposit insurance coverage, ownership, and banks' risk-taking in emerging markets.Journal of International Money and Finance. Volume 29(2), pp. 252-274.

Angkinand, A. P., Sawangngoenyuang W. and Wihlborg, C. (2010b). Financial Liberalization and Banking Crises.International Financial Review, Volume 10(2), pp. 263-292.

Avery B. Robert, Belton M. Terrence and Goldberg A. Michael (1988). Market Discipline in Regulating Bank Risk: New Evidence from the Capital Markets. Journal of Money, Credit and Banking,Vol. 20, No. 4 (1988), pp. 597-610.

Bresnahan, Timothy. (1982). The oligopoly solution concept is identified.Econometric Letters, 10(1-2), 87-92.

Calomiris, Charles W. (1990). Is Deposit Insurance Necessary: A Historical Perspective.The Journal of Economic History, Volume 50(2), pp283-295.

Claessens S. and Laeven L. (2004). What Drives Bank Competition? Some International Evidence.Journal of Money, Credit and Banking,. 36(3),pp.563-83

Demirguc-Kunt, Asli and Enrica Detragiache (1997). The Determinants of Banking Crises: Evidence from Developing and Developed Countries.IMF Working Paper No. 97/106.

Demirguc-Kunt, Asli and Enrica Detragiache (1998). Financial Liberalization and Financial Fragility. International Monetary Bank Working Paper, WP/98/81.

Demirguc-Kunt, Asli and Enrica Detragiache (2000a). Does Deposit Insurance Increase Banking System Stability? IMF Working Paper, 00/3

Demirguc-Kunt, Asli and Enrica Detragiache (2000b). Monitoring Banking Sector Fragility: A Multivariate Logit Approach.World Bank Economic Review, 14(2), pp. 287-307.

Demirguc-Kunt, Asli and Enrica Detragiache (2005). Cross-Country Empirical Studies of Systematic Bank Distress: A Survey. International Monetary Bank, Working Paper 96.

Kaminsky, Graciela L. and Carmen M. Reinhart (1996). The Twin Crises: The Causes of Banking and Balance-of-Payments Problems. Federal Reserve System International Finance, Discussion Papers, No. 544.

Kaoru, Hosono, Iwaki Hiroko, and Tsuru Kotaro (1995). Banking Crisis, Deposit Insurance, and Market Discipline: Lessons from the Asian Crisis. RIETI Discussion Paper Series, 05-E-029.

Karas A, Pyle W and Schoors K. (2010). How do Russian depositors discipline their banks? Evidence of a backward bending deposit supply function. Oxford Economic Papers, (2010) 62 (1): 36-61.

Klaus P. Fischer, and Chenard, Martin (1997). Financial Liberalization Causes Banking System Fragility. Available at SSRN: http://ssrn.com/abstract=25537 or DOI: 10.2139/ssrn.25537

Ghosh, Saibal and Abhiman Das (2004). Market Discipline in Indian Bank: Does the Data Tell a Story.Econ-Paper, Working Paper, No. 0411005.

GhoshS. (2009 a). Bank risk, charter value and depositor discipline: a simultaneous equations approach.Applied Economics Letters, Volume 16(6), pp. 639-644.

GhoshS. (2009 b). Charter Value and Risk-taking: Evidence from Indian Banks. Journal of the Asia Pacific Economy, Volume 3(14) pp. 270-286.

González, Francisco (2005). Bank regulation and risk-taking incentives: An international comparison of banks risk.Journal of Banking and Finance 29, (2005), 1153-1184.

Gruben, William C., and Robert P. Macomb (1997).Liberalization, Privatization, And Crash: Mexico's Banking System in the 1990s. Federal Reserve Bank of Dallas, Economic Review, (First Quarter), pp. 21-30.

Gruben, William, Jahyeong Koo, and Robert Moore (1999). When Does Financial Liberalization Make Banks Risky? An Empirical Examination of Argentina, Canada, and Mexico.Federal Reserve Bank of Dallas in its series Center for Latin America Working Papers, No. 0399.

Gruben, William C., Jahyeong Koo and Robert R. Moore (2003). Financial liberalization, market discipline and bank risk.Federal Reserve Bank of Dallas in its series Center for Latin America Working Papers,No. 303.

Hori, M., Ito, Y. and Murata, K. (2009).Do depositors respond rationally to bank risks? Evidence from Japanese banks during crises.Pacific Economic Review, 14(5): 581–592.

Imai, Masami, (2005). Market Discipline and Deposit Insurance Reform in Japan.Wesleyan Economics Working Papers, No#2006-007.

Lau, Lawrence. (1982). On Identifying the Degree of Competitiveness from Industry Price and Output Data.Econometric Letters, vol.10, 93-99.

Loannidou, Vasso P and Jan de Dreu (2005). The Impact of Explicit Deposit Insurance on Market Discipline.Federal Reserve Bank of Chicago, Volume (5):24-139

Maechler A.M. and McDill K.M. (2006).Dynamic depositor discipline in US banks.Journal of Banking & Finance,Volume 30(7), pp. 1871-1898.

Martinez, Maria Soledad and Sergio Schmulker S. L. (2001). Do Depositors Punish Banks for Bad Behavior? Market Discipline, Deposit Insurance, and Banking Crises.The Journal of Finance, 56: 1029–1051.

Mondschean, S. Thomas and Timothy P. Opiela, (1998). Bank Time Deposit Rates and Market Discipline in Poland: The Impact of State Ownership and Deposit Insurance Reform.Working paper series, WP-98-13, Federal Reserve Bank of Chicago.

Panzer, John C., and James N. Rosse (1982). Structure, Conduct and Comparative Statistics. Bell Laboratories Economics Discussion Paper, Bell Laboratories, No 248, (1989).

Panzer, John C., and James N. Rosse (1987). Testing for Monopoly's Equilibrium. Journal of Industrial Economics, vol. 35, 443-456.

Park, Sangkyun, and Peristiani, Stavros, (1998). Market Discipline by Thrift Depositors. Journal of Money, Credit and Banking, August1, 1998. Volume (Year): 30 (1998), Issue (Month): 3, Pages: 347-64.

Saxton J. (1998).Financial Crises in Emerging Markets: Incentives and the IMF.Joint Economic Committee Study. G-01 Dirksen Senate Office, Washington DC 20500.

Shaffer, Sherrill (1989). A Non-structural Test for Competition in Financial Markets. In Bank Structure and Competition. Conference Proceedings, Federal Reserve Bank of Chicago, pp. 225-241.

Appendix A Summary of Hypothesis and Expected Signs

Equation	Variable Description	Expected Signs
Dependent Variable : Equation (1) : RTDEPGROW	Growth Rate of Inflation Adjusted Total Deposit	
ASSETQUALITY: Alternatively use LLRG, LLLP, LLRL, ILGL	(i) Ratio of Loan Loss Reserve to Gross Loan (LLRG); (ii) Ratio of Loan Loss Provision to Net Internal Reserve (LLLP); (iii) Loan Loss Reserve to Impaired Loan (LLRL); and (iv) Impaired Loan to Gross Loan (ILGL).	If the coefficient is negative and significant then we establish depositor discipline at work.
Equation (6) and (10): Dependent Variable (6): Q and Dependent Variable (10) : P		
P	Ratio of Interest Income to Total Assets	
Q	Total Assets	
Y	GDP in Constant Dollars	
Z	Deposit Rate	
W1	Ratio of Interest Expense to Total Liabilities	
W2	Ratio of Employee Expense to Total Liabilities	
C	Ratio of Total Expenditure to Total Assets	
D	Year dummy is 0 if year before 1997 and 1 if it is after	One year window of break of competition in Table 4.
D	Year dummy is 0 if year before 1996 and 1 if it is after 1998	One year window of break of competition in Table 5.
λ	Index of competition in Gruben et al – framework	If – λ is statistically significant, negative and less than zero, then monopolistic competition prevails.
$\lambda + \beta_5$		If we find that the value β_5 is negative and large, that will imply that banks significantly increased the riskiness of its behavior after liberalization and privatization