Chapter 17

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Chapter 17

Financial Crisis and Effects of Bank Regulation on Bank Performance in Key Asian Countries

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This paper studies the effects of bank regulation on the efficiency of banks in the Asian countries Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. The study covers nearly 600 banks from 1990 to 2008 and accounts for individual bank characteristics, bank regulatory measures, differences of bank ownership, and institutional differences. The paper adopts different measures of bank efficiency such as returns on average assets (ROAA) and returns on average equity (ROAE) to study the impact of regulation on bank efficiency. These two measures are expected to capture the types of risk that the banks are adopting in terms of traditional and off-balance-sheet activities to increase their profitability. The ROAA reflects the return on average assets and this is expected to increase with regulations such as higher capital requirements that enable firms to allocate their investments towards more productive and less risky assets (Berger, 1995; Demirguc-Kunt and Huizinga, 1999). In contrast, ROAE is expected to fall with more regulation such as higher capital

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requirements that tend to create deadweight loss to capital and hence reduce the profit on equity (Berger, 1995). It is also likely that regulation of the off-balance-sheet activities of banks will have more impact on ROAE in terms of reducing the excessive risk-taking activities of banks. The results indicate that higher capital requirements in terms of a higher total equity to total assets ratio seem to improve bank performance (ROAA), which is in line with managing the risk-taking activities of banks in line with the recommendations in the Basel II Accord (BIS, 2006). We also found private-sector monitoring of information tends to improve bank performance.

Keywords: banking efficiency, regulation, supervision, off balance sheet

JEL Classifications: G18, G21, G28

1. Introduction

As economies liberalize their financial sectors to increase competition and efficiency in the global market, financial institutions are also assuming greater risk in their operations. Efficient banks are able to diversify their activities and channel funds effectively to economically viable activities in the economy, thereby providing greater stability for the economy. In fact, the efficiency of banks is crucial in riding the volatility in the global market and maintaining the stability of the financial markets (Berger et al., 1993; Schaeck et al., 2009. In turn, a competitive environment is expected to increase risk-taking activities as banks are forced to adopt non-traditional banking activities to maintain their share in the financial markets (Edward and Mishkin, 1995). This increases the regulatory concerns that too much competition in the financial market could lead to excessive risk-taking behaviour, leading to instability in the financial markets.

The 2007 Global Financial Crisis (GFC) is a good example of excessive off-balance-sheet activities of banks leading to a financial and global crisis. The traditional banking model was replaced with an "originate and distribute" banking model where loans are pooled, tranched and then resold via securitization (Brunnermeier, 2009). There was an unprecedented credit expansion in financial innovations that would supposedly make the banking system more stable by transferring risk to those most able to bear it. To offload the risk, banks repackaged these loans and passed them to other financial investors through structured products often referred to as collateralized debt obligations (CDOs). Financial-market regulations play an important role in maintaining the balance between competition and risk-taking activities in the financial sector, thereby affecting the efficiency of the financial institutions.

This paper studies the determinants of bank performance in the Asian region. In particular, the paper analyzes the sources of bank performance in Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. The study covers nearly 600 banks

from 1994 to 2008. The study adopts two measures of bank performance as dependent variables: returns on average assets (ROAA) and returns on average equity (ROAE). These two measures are expected to capture the types of risk that the banks are adopting in terms of traditional and off-balance-sheet activities to increase their profitability. The rate of return on average assets (ROAA) measures the overall profitability of the banks and the efficiency of banking operations. The ROAA reflects the return on average assets and this is expected to increase with regulations such as higher capital requirements that enable firms to allocate their investments towards more productive and less-risky assets (Ben Naceur and Goated, 2008; Demirguc-Kunt and Huizinga, 1999; Saunders and Schumacher, 2000). In contrast, the rate of return on average equity (ROAE) captures the returns to shareholders of the bank, reflecting the risk-taking activities of the banks such as off-balance-sheet activities. The impact of regulation on ROAE is expected to be different in terms of regulating the risk-taking activities of banks. For example, ROAE is expected to fall with more regulation such as higher capital requirements that tend to create deadweight loss to capital and hence reduce the profit on equity (Berger, 1995). It is likely that regulation of the off-balance-sheet activities of banks will have more impact on ROAE in terms of reducing the excessive risk-taking activities of banks.

The study is expected to improve the institutional, regulatory and supervisory framework of financial institutions in the region by identifying factors that could contribute to their efficiency, thereby strengthening the banking system. Since bank regulation tends to reduce competition and excessive risk taking in the financial market, it will also reduce innovative activities in the sector. Recent studies also highlight, however, the positive impact of regulations on banking activities in terms of increased market monitoring and a better-quality contracting environment, both of which have positive impacts on bank performance (Gonzales, 2009). In this paper, we study the impact of bank regulation and supervision on bank efficiency using factors such as the level of bank regulation on the activities that generate non-interest income, the intensity

of private monitoring (bank supervision), and the index on the intensity of official supervision by the central bank.

The paper also studies the impact on bank performance of regulating financial markets, in terms of opening up the financial sector for foreign participation and foreign ownership. The impact of financial-market liberalization is particularly important in the case of the Southeast Asian financial sector after the Asian Financial Crisis (AFC). It might also be important to study the impact of foreign participation on the productive performance of banks in the long term. A recent study by Kose et al. (2009 also shows that financial openness has a robust positive impact on total factor productivity (TFP) growth in the domestic economy. In conjunction, Xu (2010) provides strong empirical evidence that foreign entry is supportive of a more competitive and efficient banking industry in China.

This study also examines the impact of off-balance-sheet activities of banks on their efficiency, since banks are increasingly using off-balance-sheet activities in pursuit of higher profits and satisfying the increase in consumer demand for non-banking products. These off-balance-sheet activities could lead to excessive risk taking, thereby affecting the efficiency of banks.

The study also contributes to the understanding of misallocation of funds by banks due to moral-hazard issues, since banks might use their state-level influence and guarantees to divert funds to unproductive activities (Radelet and Sachs, 1998). To capture the moral-hazard issues in the productive performance of banks, we used equity to asset ratios and corporate linkages to the bank in terms of bank ownership of subsidiaries or corporate ownership of banks.

There are several key policy implications from the paper. The results indicate that an increase in capital requirements tends to improve bank performance in terms of higher returns on average assets (ROAA). This clearly indicates that banks tend to diversify and manage their risk better with higher capital requirements. Higher capital requirements in terms of a higher total equity to total assets ratio seem to improve bank

performance, which is in line with managing the risk-taking activities of the bank in line with the recommendations of the Basel II Accord (BIS, 2006). We also found private-sector monitoring of financial activities seems to have a positive impact on the performance of banks. Given the diverse stages of growth and development in the region, the supervisory role of central banks is crucial, but the results of the paper highlight the importance of private-sector monitoring as a better risk-management tool compared with bank regulation and supervision.

The paper is organized as follows. Section 2 discusses the methodology. Section 3 presents the construction of the data. The results are presented in Section 4. Section 5 concludes.

2. Empirical Methodology

The paper adopts a panel data framework to study the determinants of bank efficiency. The regression equation is given as:

$$Bank\text{-}Perf_{it} = \alpha_0 + \alpha_1 Fin_{it} + \alpha_2 Reg_{it} + \alpha_3 Types_{it} + \alpha_4 Bank\text{-}Perf_{it-1} + \mu_I + \theta_t + \varepsilon_{it}, \quad (1)$$

where $Bank\text{-}Perf_{it}$ is the bank performance measure of bank i in year t; Fin_{it} is the set of specific characteristics of bank i at year t; Reg_{it} is the set of bank regulatory and supervision variables; $Types_{it}$ captures the bank types; θ_t are dummies to capture any unobserved bank-invariant time effects not included in the regression; u_i are unobservable bank-specific effects that vary across the banks but are constant over time; and ε_{it} are white-noise error terms. We adopt three alternative measures of bank performance: cost of intermediation, operating performance and bank profitability.

We use fixed effects and random effects to estimate equation (1). It is very likely that there are endogeneity problems in equation (1) in terms of reverse causation, as bank regulation and supervision might be responding to the efficiencies of the bank. Thus, failure to account for the simultaneity problems might lead to biased estimation and coefficients. To address this problem, we adopt the two-stage least square fixed-effects (FE2SLS) and two-stage least square random-effects (RE2SLS) estimators as provided by Baltagi (2001). Both FE2SLS and RE2SLS are expected to control for the presence of unobservable bank-specific effects and the potential endogeneity of bank efficiency.

3. Data and Construction of Variables

3.1. Data

The main bank-level data for the study are obtained from the Bankscope Database, including bank-level information to estimate bank efficiency. All data used are expressed in 1996 US dollar terms and consolidated bank balance-sheet and income-statement data will be used whenever available. The construction of regulatory and supervisory variables is based on Barth et al. (2004, 2006) and the World Bank's Bank Regulation and Supervision Database. The full description of the data is given in Table A1 in the Appendix.

3.2. Variables

3.2.1. Bank Performance Measure

To measure bank performance, we adopted two different measures of bank profitability: 1) return on average assets (ROAA) measured as net income divided by average total assets; and 2) return on average equity (ROAE) measured as net income

divided by average total equity. The rate of return on average assets measures the overall profitability of the banks and the efficiency of banking operations. In contrast, the rate of return on average equity captures the returns to shareholders of the bank, reflecting the risk-taking activities of the banks such as off-balance-sheet activities.

3.2.2. Bank Regulation and Supervision

The study used three key regulatory and supervisory variables. Bank regulations restricting activities that generate non-interest income are given as RESTRICT. The average RESTRICT measures indicate if bank activities in the securities, insurance and real estate markets, as well as bank ownership and control of non-financial firms, are unrestricted, permitted, restricted or prohibited. Higher values indicate more restrictions on bank activities and non-financial ownership and control.

The bank supervision variables are represented by the intensity of private monitoring (MONITOR) and official supervision of banks (OFFICIAL). Both these variables were derived as given in Barth et al. (2004, 2006). The MONITOR index contains information regarding the external auditing of banks, the ratings by international agencies, the availability of an explicit deposit insurance scheme, and the disclosure of risk-management procedures to the public. The OFFICIAL index provides information regarding the extent to which regulators have the authority to take regulatory actions. Higher values for MONITOR and OFFICIAL indicate greater private oversight and more official supervisory power respectively.

3.2.3. Specific Characteristics of Financial Institutions

We used several variables to capture specific banking activities that could directly affect the productive performance of banks. Several studies have highlighted the importance of capital requirements in reducing the risk-taking activities of banks. To capture the effect of capital requirements, we introduced the total equity to total assets

ratio (TE_TA) in our study. In order to capture liquidity effects, we used the loan loss reserve to total loans ratio (LOANLR_GL), the liquid assets to total assets ratio (LA_TA), and the non-earning assets to total asset ratio (NEA_A). To account for the off-balance-sheet activities of banks, we used the off-balance-sheet to total assets ratio (OFFBAL_A).

The impact of foreign ownership and partnership on bank performance is given by a dummy variable, FOREIGN, which represents majority foreign ownership of more than 50 percent equity. We also indicate if the bank is a public bank (PUBLIC) if the government has more than 25 percent ownership. To capture the moral-hazard issues related to bank ownership of subsidiaries or corporate ownership of banks, we introduce the dummy variable SUBSIDIARY that indicates if the bank is a subsidiary or if it has a subsidiary. We also introduce dummy variables to capture the types of banking activities.

4. Results: Determinants of bank performance

The results of the panel study are given in Tables 1–4. In Tables 1 and 2, we report the bank performance estimations of ROAA and ROAE using the fixed-effect (FE) and random-effect (RE) specifications respectively. To account for bank-specific effects and endogeneity issues in our estimation, we adopted the two-stage least square estimation for fixed-effect (FE2SLS) and random-effect (RE2SLS) specification proposed by Baltagi (2001). We used the liquid assets to total bank deposits and borrowing ratio, the employment share of the banks, and types of banks as instrumental variables in the estimation. The results of FE2SLS and RE2SLS estimation are reported in Tables 3 and 4. The results of our study are very consistent across both the fixed-effect (FE) and random-effect (RE) specifications.

4.1. Specific Bank Characteristics

It is interesting to note that bank-specific characteristics have an important impact on the performance of banks as measured by the return on average equity, ROAA. TE_TA, the capital requirement variable, is positive and statistically significant, which indicates that an increase in the capital requirements of banks tends to improve their performance. This suggests that banks might experience better risk management if they assume greater ownership of their activities. This result is in line with the recent recommendation by the Basel II Accord to increase capital requirements to manage the risk-taking activities of banks (BIS, 2006). The estimation based on FE2SLS and RE2SLS indicates that the impact of TE_TA on bank performance measured by ROAA is much stronger and more robust (see Tables 3 and 4).

Table 1. Determinants of Bank Performance Based on Rate of Return on Average Assets (ROAA) in Selected Southeast Asian Banks

	FE(1)	FE(2)	RE(1)	RE(2)
TE_TA	4.207** (2.200)	4.147** (2.470)	4.892** (2.240)	4.927** (2.480)
LOANLR_GL	–8.511* (–1.700)	–8.667* (1.701)	–9.241* (1.720)	–9.246* (–1.720)
LA_TA	0.254 (0.410)	0.215 (0.340)	1.107 (0.870)	1.021 (0.980)
NEA_A	–0.871 (–1.040)	-	–0.256 (–01.60)	-
OFFBAL_A	–0.002 (–0.030)	0.006 (0.100)	–0.027 (–0.350)	–0.027 (–0.370)
FOREIGN	0.528** (2.720)	0.415* (1.840)	0.350* (1.710)	0.345* (1.720)
PUBLIC	–0.020 (–0.009)	–0.142 (–0.080)	–0.103 (–0.440)	–0.104 (–0.450)
SUBSIDIARY	0.445** (2.250)	0.455** (2.030)	0.689** (2.700)	0.697** (2.680)
RESTRICT	–0.277 (0.849)	–0.278 (–0.920)	–0.358 (–1.510)	–0.343 (1.220)
MONITOR	0.61 (1.350)	0.532* (1.750)	0.598 (1.130)	0.505** (1.940)
OFFICIAL	0.173 (0.430)	0.235 (0.630)	–0.062 (–0.130)	–0.040 (–0.110)
Commercial banks	0.277 (0.330)	0.232 (0.300)	1.120** (2.360)	1.114** (2.530)
Investment banks	0.1493 (0.670)	0.453 (0.070)	1.340** (2.660)	1.337** (2.630)
Finance and securities companies	0.826 (0.940)	0.830 (0.850)	1.750** (3.150)	1.757** (3.160)
Savings banks	0.320	0.320	1.129*	1.130*

	(0.820)	(0.900)	(1.700)	(1.650)
Holding finance companies	–0.911 (–0.110)	–0.114 (–0.140)	0.789 (1.460)	0.784 (1.470)
Government savings banks	1.065 (1.290)	1.030 (1.310)	2.046** (4.930)	2.049** (4.970)
Islamic banks	–1.285 (–0.780)	–1.330 (–0.850)	–0.390 (–0.930)	–0.409 (–0.410)
Others	1.560* (1.740)	1.570* (–1.720)	1.689** (2.940)	1.705** (3.000)
Constant	–3.710 (–0.820)	1.791*** (5.080)	–1.020 (–0.160)	–1.198 (–0.210)
Country dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
R-square	0.112	0.118	0.108	0.110
Observations	1,359	1,359	1,359	1,359

Note: Statistical significance levels: * 10 percent; ** 5 percent; *** 1 percent. t-statistics in parentheses; FE = fixed effects; RE = random effects.

Table 2. Determinants of Bank Performance Based on Rate of Return on Average Equity (ROAE) in Selected Southeast Asian Banks

	FE(1)	FE(2)	RE(1)	RE(2)
TE_TA	11.850 (0.990)	10.730 (0.580)	22.640 (0.880)	21.820 (0.870)
LOANLR_GL	–1.390*** (–9.250)	–1.410** (–2.520)	–1.420** (–2.480)	–1.420** (–2.480)
LA_TA	6.240 (0.690)	5.204 (0.700)	19.220 (1.230)	17.940 (1.240)
NEA_A	–11.220 (–0.920)	-	–3.850 (–0.430)	-
OFFBAL_A	0.961** (1.910)	1.108** (2.360)	0.535 (0.910)	0.584 (1.100)
FOREIGN	2.640 (0.760)	2.423 (0.720)	1.384 (0.470)	1.311 (0.450)
PUBLIC	0.347 (0.110)	0.341 (0.100)	0.894 (0.250)	0.881 (0.450)
SUBSIDIARY	4.728 (1.240)	4.857 (1.260)	8.840** (1.990)	8.824** (1.990)
RESTRICT	–4.471 (–1.030)	–3.713 (–1.010)	–5.490 (–1.220)	–5.264 (–1.214)
MONITOR	12.604** (2.180)	11.242** (2.430)	11.74** (2.130)	11.280** (2.760)
OFFICIAL	2.408 (0.409)	3.220 (0.740)	–0.950 (–0.150)	–0.650 (–0.110)
Commercial banks	–2.221 (–0.600)	–2.800 (–0.820)	9.565** (2.050)	9.481** (1.950)
Investment banks	3.660 (0.980)	3.160 (0.870)	14.890** (2.660)	14.850** (2.620)
Finance and securities companies	8.180* (1.850)	–6.050* (–1.840)	21.500** (3.350)	21.453** (3.370)
Savings banks	0.890 (0.550)	0.950 (0.600)	16.460** (2.560)	16.530** (2.620)
Holding finance companies	–5.740 (–1.150)	–6.050 (–1.220)	6.591 (1.340)	6.612 (1.370)
Government savings banks	17.280** (3.120)	17.089** (3.290)	30.590** (3.450)	30.646** (3.470)
Islamic banks	–7.580 (–1.320)	–8.169 (–1.500)	5.570 (1.200)	5.418 (1.140)
Others	–12.910** (1.950)	–13.200** (–2.100)	13.900** (3.050)	14.050** (3.320)

Constant	–66.000 (1.400)	–72.620 (1.100)	–27.310 (–0.310)	–30.030 (–0.350)
Country dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
R-square	0.114	0.116	0.112	0.115
Observations	1,359	1,359	1,359	1,359

Note: Statistical significance levels: * 10 percent; ** 5 percent; *** 1 percent. t-statistics in parentheses; FE = fixed effects; RE = random effects.

Table 3. Determinants of Bank Performance Based on Rate of Return on Average Assets (ROAA) Using IV Estimation in Selected Southeast Asian Banks

	FE2SLS		RE2SLS	
	(1)	(2)	(3)	(4)
TE_TA	6.675*** (3.880)	6.474** (4.720)	7.475** (4.020)	7.550** (3.850)
LOANLR_GL	–11.420* (–1.710)	–1.478** (–2.800)	–11.428** (–2.070)	–11.475* (–1.850)
LA_TA	0.677 (0.76)	0.480 (0.990)	1.435 (1.200)	1.161 (1.060)
NEA_A	–0.645 (–0.430)	-	0.021 (0.200)	-
OFFBAL_A	0.049* (1.740)	0.052* (1.700)	0.022 (0.380)	0.047 (1.220)
FOREIGN	0.435** (2.040)	0.418** (2.320)	0.349** (2.060)	0.529** (2.490)
PUBLIC	0.091 (0.410)	0.014 (0.440)	0.125 (0.5900)	0.228 (0.730)
SUBSIDIARY	0.313** (1.850)	0.317* (1.690)	0.652** (2.810)	0.570** (4.180)
RESTRICT	–0.166 (0.620)	–0.125 (–0.490)	–0.254* (–1.860)	–0.263** (–2.060)
MONITOR	0.591 (1.450)	0.540 (1.400)	0.475 (1.450)	0.592** (2.010)
OFFICIAL	0.198 (0.590)	0.253 (0.770)	–0.010 (–0.070)	–0.025 (–0.150)
Commercial banks	–1.040** (–2.700)	–1.088** (–4.400)	–0.954** (–1.990)	–1.388** (–2.750)
Investment banks	–0.830* (–1.830)	–0.879** (–2.450)	–0.846 (–1.400)	–1.270** (–2.080)
Finance and securities companies	–0.391 (–0.970)	–0.424 (–1.230)	–0.200 (–0.390)	–0.689 (–1.260)
Savings banks	0.439 (0.320)	0.445 (0.360)	1.033 (0.860)	0.394 (0.310)
Holding finance companies	–1.431** (–3.980)	–1.463** (–4.800)	–1.313** (–2.460)	–1.740** (–3.110)
Government savings banks	–0.295 (0.450)	–0.319 (–0.829)	–0.037 (–0.070)	–0.524 (–1.030)
Islamic banks	–0.822*** (3.050)	–0.896** (–2.650)	–0.815 (–1.320)	–1.068** (–1.940)
Others	–2.044** (–4.310)	–2.080** (–4.200)	–1.890** (–3.070)	–2.290** (–3.610)
Constant	–3.869 (–0.700)	–4.121 (–0.950)	–4.220 (–0.390)	–3.920 (–0.891)
Country dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
R-square	0.154	0.152	0.159	0.152
Observations	1,220	1,220	1,220	1,220

Note: Statistical significance levels: * 10 percent; ** 5 percent; *** 1 percent. t-statistics in parentheses; FE2SLS = two-stage least square fixed effects; RE2SLS = two-stage least square random effects (Baltagi, 2001).

Table 4. Determinants of Bank Performance Based on Rate of Return on Average Equity (ROAE) Using IV Estimation in Selected Southeast Asian Banks

	FE2SLS		RE2SLS	
	(1)	(2)	(3)	(4)
TE_TA	34.100 (1.22)	26.870 (1.170)	43.250 (1.430)	40.688 (1.250)
LOANLR_GL	–1.226* (–1.670)	–1.240* (–1.730)	–1.255* (–1.750)	–1.210* (–1.890)
LA_TA	13.060 (1.020)	6.369 (0.750)	24.730 (1.380)	16.320 (0.990)
NEA_A	–23.030* (–1.770)	-	–13.830* (–1.650)	-
OFFBAL_A	1.268** (2.320)	1.530** (2.430)	0.928** (2.170)	1.465** (2.560)
FOREIGN	3.340 (1.020)	2.720 (1.000)	1.980 (0.660)	4.190* (0.990)
PUBLIC	4.412 (1.060)	0.095 (0.280)	1.134 (0.260)	2.670 (0.560)
SUBSIDIARY	0.822 (0.230)	4.550 (1.280)	9.440** (2.360)	8.170** (2.620)
RESTRICT	–5.170 (–1.290)	–3.067 (–1.000)	–6.490*** (–3.140)	–6.150*** (–3.050)
MONITOR	14.440*** (2.550)	11.320** (2.120)	12.940*** (3.100)	12.825*** (3.050)
OFFICIAL	1.200 (0.250)	3.182 (0.700)	1.940 (0.890)	1.460 (0.630)
Commercial banks	–8.710** (–2.340)	–10.390*** (–2.930)	–6.643** (–1.990)	–13.533** (2.170)
Investment banks	–5.420 (–1.280)	–7.180* (–1.710)	–4.560 (–0.620)	–11.582 (–1.490)
Finance and securities companies	2.140 (0.5310)	1.200 (0.300)	6.110 (0.880)	1.147 (0.220)
Savings banks	–4.980 (–0.590)	–4.710 (0.050)	5.770 (0.640)	3.291 (0.380)
Holding finance companies	–12.660** (2.300)	–13.980** (–2.650)	–10.010* (–1.650)	–16.670** (–2.510)
Government savings banks	8.250 (0.940)	7.410 (1.140)	12.613* (1.650)	5.230 (0.780)
Islamic banks	–6.170 (0.670)	–8.880** (1.930)	–4.550 (–0.520)	–9.840 (–1.490)
Others	–19.002** (–2.620)	–22.410*** (–3.890)	–16.040*** (–2.990)	–22.520*** (–3.650)
Constant	–53.300 (–0.570)	–69.090 (–1.800)	–68.000 (–1.020)	–88.100 (–1.160)
Country dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
R-square	0.100	0.110	0.110	0.100
Observations	1,220	1,220	1,220	1,220

Note: Statistical significance levels: * 10 percent; ** 5 percent; *** 1 percent. t-statistics in parentheses; FE2SLS = two-stage least square fixed effects; RE2SLS = two-stage least square random effects (Baltagi, 2001).

The estimation based on average equity, ROAE, indicates, however, that the capital-requirement variable is not statistically significant. This is also quite robust with the FE2LS and RE2LS, which indicate that imposing a higher equity share on the banks tends to have some impact on the returns to shareholders of the bank.

The variables capturing the bank liquidity effects are not statistically significant and negative for both ROAA and ROAE. The non-earning assets to total assets ratio (NEA_A) is statistically significant in Table 2 using ROAE and not ROAA. In fact, it is very robust for the FE2LS and RE2LS. The higher bank liquidity affects the bank profitability but it does manage the liquidity risk of the banks. The negative impact clearly identifies the importance of non-earning assets to the profitability for shareholders. The ratio of liquid assets to total assets is not, however, statistically significant in our estimation.

We also noticed that the loan loss reserve to gross loans ratio (LOANLR_GL) is negative and statistically significant in FE2SLS and RE2SlS estimations as indicated in Tables 3 and 4. The provisions for more reserves to protect loan losses and more liquid assets tend to reduce the profitability of banks and the impact is greater on ROAA.

The off-balance-sheet effect of banks (OFFBAL_A) is positive and statistically significant for the estimation with return on equity, ROAE. This reflects that shareholders have a greater incentive to undertake more risk with off-balance-sheet activities to maintain high returns on their equities. This result is also robust to the FE2SLS and RE2SLS estimations. The positive coefficient of off-balance-sheet activities indicates that managing the non-traditional activities of banks will lead to positive outcomes on managing the risk-taking activities of the banks.

Foreign participation and ownership in the financial sector tend to yield positive outcomes on overall banking performance, as indicated by the positive and statistically significant coefficient for the FOREIGN variable in the ROAA estimation. Again, the result is robust to the 2SLS estimations given in Table 4, indicating that financial openness to foreign investment and competition does improve bank performance. We

do not, however, observe any impact of foreign ownership on bank performance using the return on equity, ROAE.

Banks that are subsidiaries and banks taking ownership of companies tend to increase bank performance and efficiency, as indicated by the positive coefficient of the SUBSIDIARY variable for both ROAA and ROAE estimations. This result is statistically significant at the 5 percent level and robust to FE2SLS and RE2SLS estimations. This clearly indicates that mergers and acquisitions by banks do have a positive impact on their rate of returns, although there could be moral-hazard issues if banks take ownership of companies and if banks are bought out by corporations. Thus, there are again some trade-offs in balancing competition and risk taking with the overall stability of the financial markets.

The results indicate that the types of banking activities have different impacts on the efficiency of banks in Southeast Asia and thus diversification of banking activities is important to maintain banking performance and efficiency. Commercial savings banks and holding finance companies tend to have lower impacts on banking efficiency.

4.2. Bank Regulation and Supervision

The results for the banking regulation and supervision variables of RESTRICT (restrictions on activities that generate non-interest income) and MONITOR (intensity of private monitoring) are statistically significant and robust. The OFFICIAL (index of official supervision) variable, however, is not statistically significant in our estimation.

The MONITOR variable in our study is positive and statistically significant at the 1 percent level for the ROAE estimation. This result is very robust in our FE2SLS and RE2SLS specifications. This result indicates that monitoring is an effective tool to manage the risk-taking activities of the banks, and that it also has a positive impact on the return on equities. Compared with monitoring, the RESTRICT variable is negative and reduces the returns on equities. This suggests that restricting activities for non-interest income is a very strong tool that directly affects the activities of the banks and

also provides a disincentive to bank investment. It is likely that more developed and well-diversified financial markets will rely heavily on the private sector to provide more information on the activities of the banks to depositors and potential investors. Thus it might be productive to provide more information and monitor the activities of the banks.

The above results suggest that the regulatory role of central banks in the region is crucial in maintaining bank efficiency and stability in the financial sector. Monitoring the balance-sheet activities of banks tends to improve the productive performance of banks in our sample. Although the bank supervisory variable of OFFICIAL is not statistically significant in our estimations, it is important as the transparency of supervisory functions of the central bank produces positive outcomes for the banks and improves their efficiency.

5. Conclusion

This paper studied the determinants of bank performance in Southeast Asia using individual bank data from 1994 to 2008. The study carefully controlled for endogeneity issues by adopting the two-stage least square estimation of fixed and random effects as provided by Baltagi (2001). The results indicate that increases in capital requirements tend to improve bank performance in terms of higher returns on average assets (ROAA). This clearly indicates that banks tend to diversify and manage their risk better with higher capital requirements. Higher capital requirements in terms of a higher total equity to total assets ratio seems to improve bank performance, which is in line with managing the risk-taking activities of banks. This result is in line with the recommendations in the Basel II Accord (BIS, 2006), which suggest that capital requirements could mitigate the credit and operational risk of banks by shifting the risk-

taking activities to the managers and owners of banks. Recently, the Council of International Relations (2009) also suggested that capital requirements could be used as an effective tool to discipline the risk-taking activities of large banks. To manage the risk of larger banks, they should have higher capital requirements than smaller banks if all other factors are equal. Furthermore, capital requirements linked to risk-sensitive assets and short-term debt could effectively discipline the risk-taking activities of the banks. Thus, capital requirements should be higher for banks that have risk-sensitive assets and finance their operations with short-term debt.

The results of this paper also highlight certain key activities that could be valuable to policymakers in improving banking efficiency and stability in the financial markets. The results indicate that increases in capital requirements tend to improve bank performance in terms of higher returns on average assets (ROAA). This clearly indicates that banks tend to diversify and manage their risk better with higher capital requirements. Higher capital requirements in terms of a higher total equity to total assets ratio seem to improve bank performance, which is in line with managing the risk-taking activities of banks. This result is in line with the recommendations of the Basel II Accord (BIS, 2006). This is an important result in light of the GFC precipitated by the financial innovation activities of banks, which unbundled their risky loans through derivative and structured products such as collateralized debt obligations (CDOs), leading to excessive risk in the market. Thus, it is crucial to manage the risk associated with different types of off-balance-sheet and financial innovation activities as the financial markets in the Southeast Asian region develop, since non-traditional activities have a direct impact on the returns on equity.

It is also interesting to observe from the results that corporate linkages and mergers of banks tend to increase bank profitability. Based on experience from the AFC, these moral-hazard linkages between corporations and banks have to be carefully monitored and these relationships made transparent to ensure the stability of financial markets. Although there has been greater monitoring of such linkages since the AFC, such

linkages still exist in the Southeast Asian region and require continued monitoring by central banks.

Private-sector monitoring of financial activities also seems to have a positive impact on the performance of banks. Given the diverse stages of growth and development in the region, the supervisory role of central banks is crucial, but the results of the paper highlight the importance of private-sector monitoring as a better risk-management tool compared with bank regulation and supervision. In particular, central bank restrictions on the risky activities of banks tend to reduce bank profitability, highlighting the importance of a better system of monitoring and supervising the risk-sensitive activities of banks.

The results of the paper also have important implications for liberalizing the financial sector by increasing foreign ownership and participation in the financial sector. The results indicate that there are positive impacts on bank performance from foreign ownership and participation. Thus, the financial openness of the financial markets will be important for their development and regional integration.

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Appendix

Table A2. Description of Variables

Period	1994–2008
Country	**Coverage of number of banks**
Indonesia	129
Malaysia	131
Singapore	110
Thailand	73
The Philippines	83
Vietnam	43
Description	**Variables**
Total equity/total assets	TE_TA
Loan loss reserve/gross loans	LOANLR_GL
Liquid assets/total assets	LA_TA
Non-earning assets/assets	NEA_A
Off balance sheet/assets	OFFBAL_A
Majority foreign owned	FOREIGN
Public bank (> 25% govt ownership)	PUBLIC
Subsidiary or has subsidiary	SUBSIDIARY
Bank regulation and supervision	
Bank regulation: restrictions on activities that generate non-interest income	RESTRICT
Bank supervision: intensity of private monitoring	MONITOR
Bank supervision: official supervision	OFFICIAL
Return on average assets	ROAA
Return on average equity	ROAE