

Appendix

Robustness Test

The robustness of the results generated by SFA is tested through replacing the full sample with the three sub-period samples (pre-crisis, crisis, and post-crisis periods). Then the expected profit and cost inefficiency scores of each bank observation are generated period by period. The specification of the SFA model is modified by deleting the crisis and post-crisis dummies. After the inefficiency scores are generated, the correlation analysis is conducted.

I. Inefficiency scores generated from the parametric approach (Stochastic Frontier Approach)

The maximum likelihood estimates are generated period by period (without the crisis and post-crisis dummies) by using the three sub-samples: pre-crisis period, crisis period, and post-crisis periods. After the inefficiency scores are generated for each bank year observation, the average inefficiency of all banks are computed for each year. The inefficiency scores are in panel A of Table A.1.

The results from this period by period case are not quite the same as the full sample case (see Table 5.6). However, it still can be concluded that the profit and cost inefficiencies of Thai commercial banks are changing overtime, and the cost inefficiency score of the post-crisis period is higher than that of the pre-crisis period.

The average profit inefficiency is the highest for the pre-crisis period, 39.32 percent, then decreased to 25.01 percent during the crisis period, then increased

slightly to 25.32 percent during the post-crisis period. Two possible explanations are provided. First, the different economic situations for three periods can help to illustrate the changes of the inefficiency. The real GDP growth (see Table 5.1) is above 8 percent for six consecutive years during the pre-crisis period. Thus, average Thai commercial banks could easily enjoy the high profits even with the relatively low efficiency compared to the best-practice bank. However, the average profit inefficiency of Thai commercial banks was decreased sharply during the crisis period, since the negative or nearly zero real GDP growth and financial crisis forced Thai commercial banks to improve their efficiency compared to the best-practice bank to compete for the profit. Then the level of inefficiency was just increased slightly during the post-crisis period even with the improved economic situation. Second, the construction of the dependent variable makes the results not comparable. The dependent variable is the natural logarithm of the profit. To avoid that the natural logarithm is taken of a non-positive number, a positive constant is added to each bank's net profit if the minimum profit observation is non-positive. Therefore, a large positive constant (due to a huge negative profit) and a smaller positive constant are added to net profits of the crisis period and post-crisis period respectively. Thus, the net profits of the crisis period and post-crisis period are boosted by the added amounts. The profit efficiency scores are higher than the true level. That is the reason why the profit inefficiency level is the lowest for the crisis period when the loss is also the highest. This result indicates that the profit inefficiency score generated by the SFA approach is sensitive to the sample selection when the profits are not all positive.

However, the average cost inefficiency is always increasing, from 5.12 percent in the pre-crisis period to 6.44 percent in the crisis period, and to 10.39 percent in the

post-crisis period. The reason for this increase could be that the cost efficiency gap between the ideal bank and the average bank is increasing overtime, and the banks are using more variable costs than before. For instance, banks are hiring more capable employees to screen and construct loan portfolios after the crisis, or to manage the market risk; hence, they are paying more for the expertise. The average personnel expense is increased from 0.166 million Baht per employee during the pre-crisis period to 0.223 and 0.279 million Baht per employee during the crisis and post-crisis periods respectively.

The result of cost inefficiency scores from this period by period case is comparable to the full sample case although the magnitudes of inefficiency scores are not exactly the same. Thus it can be concluded that the cost inefficiency score generated by the SFA approach is insensitive to the sample selection because there are no non-positive cost figures.

To see whether the differences of the mean inefficiency scores for the three periods are significant, the t-tests are conducted. Panel B of Table A.1 presents the t-statistics and the p-values. Again, the differences between the pre-crisis and post-crisis periods are significant at 1 percent significance level. The conclusion is that the post-crisis period has the higher cost or the lower profit inefficiency level than the pre-crisis period does.

Table A.1

Annual average cost and profit inefficiencies of Thai commercial banks generated by Stochastic Frontier Approach (SFA) and the t-test

	Year	Annual average Eup	Annual average Eucv
Panel A: inefficiency scores			
Pre-crisis period	1990	0.3953	0.0463
	1991	0.4337	0.0308
	1992	0.4147	0.0437
	1993	0.3869	0.0713
	1994	0.3156	0.0871
	1995	0.3087	0.0463
	1996	0.4978	0.0332
	Mean	0.3932	0.0512
Crisis period	1997	0.3053	0.0339
	1998	0.1736	0.0850
	1999	0.2607	0.0532
	2000	0.2608	0.0857
	Mean	0.2501	0.0644
Post-crisis period	2001	0.2617	0.0959
	2002	0.2802	0.0870
	2003	0.2935	0.0694
	2004	0.2159	0.1258
	2005	0.2148	0.1414
	Mean	0.2532	0.1039
Panel B: t-test of equal means			
Pre-crisis vs. crisis period		3.844*** (0.003)	-0.885 (0.208)
Crisis vs. post-crisis period		-0.097 (0.463)	-2.164** (0.034)
Pre-crisis vs. post-crisis period		4.694*** (0.000)	-3.458*** (0.005)

Note: The inefficiency scores are generated by three sub-samples: the pre-crisis sample is from 1990 to 1996 with 104 observations; the crisis sample is from year 1997 to 2000 with 49 observations; and the post-crisis sample is from year 2001 to 2005 with 62 observations. Eup is expected profit inefficiency score; and Eucv is the expected cost inefficiency score where the cost is total variable costs. Panel B lists the t-statistics of each t-test of two equal means, and the p-values are in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

II. Inefficiency scores generated from the combination approach (Stochastic Frontier Approach and Data Envelopment Analysis)

The expected inefficiency scores generated period by period using the combination approach (SFA and DEA) are recorded in panel A of Table A.2. The results are similar to previous inefficiency scores generated by the parametric approach (see Table A.1). The average cost inefficiency level of the post-crisis period is higher than that of the pre-crisis period, and the average profit inefficiency has the opposite pattern. The t-test results in panel B of Table A.2 show that the post-crisis inefficiency level is significantly (at 1 percent significance level) different from the pre-crisis inefficiency level. The average EupCCR and EupBCC are nearly the same: about 39 percent for the pre-crisis period and about 24 percent for the post-crisis period. The average EucvCCR and EucvBCC are around 5 percent for the pre-crisis period and 10 percent for the post-crisis period.

Table A.2

Average inefficiency scores generated by the combination approach (Stochastic Frontier Approach and Data Envelopment Analysis)

	Year	Average EupCCR	Average EupBCC	Average EucvCCR	Average EucvBCC
Panel A: Inefficiency scores					
Pre-crisis period	1990	0.3860	0.3950	0.0462	0.0505
	1991	0.4290	0.4388	0.0323	0.0318
	1992	0.4154	0.4163	0.0463	0.0424
	1993	0.3844	0.3874	0.0710	0.0706
	1994	0.3113	0.3166	0.0813	0.0891
	1995	0.3072	0.3094	0.0474	0.0426
	1996	0.4941	0.5004	0.0325	0.0300
	Mean	0.3896	0.3948	0.0510	0.0510
Crisis period	1997	0.3078	0.2955	0.0338	0.0334
	1998	0.1644	0.1602	0.0851	0.0932
	1999	0.2551	0.2667	0.0530	0.0406
	2000	0.2482	0.2709	0.0864	0.0737
	Mean	0.2439	0.2483	0.0646	0.0602
Post-crisis period	2001	0.2454	0.2461	0.1020	0.0951
	2002	0.2588	0.2635	0.0943	0.0917
	2003	0.2590	0.2723	0.0667	0.0653
	2004	0.2026	0.2064	0.1178	0.1213
	2005	0.2110	0.2082	0.1410	0.1424
	Mean	0.2354	0.2393	0.1044	0.1032
Panel B: t-test of equal means					
Pre-crisis vs. crisis period		3.7635*** (0.0035)	3.7260*** (0.0037)	-0.9279 (0.1980)	-0.5661 (0.2979)
Crisis vs. post-crisis period		0.2666 (0.4015)	0.2730 (0.3992)	-2.2343** (0.0303)	-2.2258** (0.0307)
Pre-crisis vs. post-crisis period		5.5784*** (0.0003)	5.3947*** (0.0002)	-3.7583*** (0.0035)	-3.3590*** (0.0061)

Note: The inefficiency scores are generated by three sub-samples: the pre-crisis sample is from 1990 to 1996 with 104 observations; the crisis sample is from year 1997 to 2000 with 49 observations; and the post-crisis sample is from year 2001 to 2005 with 62 observations. EupCCR and EupBCC are expected profit inefficiency scores generated with CCR dummy and BCC dummy respectively; and EucvCCR and EucvBCC are the expected cost inefficiency scores generated with the CCR dummy or BCC dummy respectively where the cost is total variable costs. Panel B lists the t-statistics of each t-test of two equal means, and the p-values are in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

III. Correlated factors

The correlation between the inefficiency scores and other factors are studied first by the OLS regression with White heteroskedasticity-consistent standard errors and covariance. However, the Durbin-Watson statistics are not all around 2. The range of Durbin-Watson statistics of all regressions is from 1.10 to 2.19. Therefore, to correct the serial correlation or autocorrelation problem, the correlation is studied again by the generalized least squares (GLS) regression with White heteroskedasticity-consistent standard errors and covariance. The GLS is estimated by the AR(1) method which simply adds “AR(1)” to the equation as if it is an independent variable (Studenmund, 2001). Although the significant variables are not exactly the same for the OLS and GLS estimates, this section reports only the GLS results.

There are four regressions conducted. The first regression investigates the relationship between inefficiency scores and macroeconomic factors, banking industry level economic factors, and bank general characteristics. The second regression studies only the bank specific financial characteristics. Further, all variables except the macroeconomic factors are pooled together to test the correlation effects. The fourth regression includes the crisis and post-crisis dummies since the efficiency score is generated period by period in this section.

Inefficiency scores from the parametric frontier approach

The correlation between the inefficiency scores generated from the parametric approach and other factors are studied through the GLS regression. Tables A.3 and

Table A.4 describe the results.

1. Eup (expected profit inefficiency) as the dependent variable

Table A.3 reports the estimates when the dependent variable is the expected profit inefficiency based on the three sub-samples: pre-crisis sub-sample, crisis sub-sample, and post-crisis sub-sample. When the dependent variable is Eup generated period by period, there are nine variables significant in different regressions at different levels of significance. Inflation and crisis are negatively related to the profit inefficiency. Foreign ownership variable is significantly negatively related to the profit inefficiency. The higher foreign ownership is linked to the lower profit inefficiency. That is, Average Thai commercial banks can improve the profit efficiency with the increased foreign ownership. Also, the large- and medium-sized banks have the higher profit efficiency. Depo_tl is negatively related to the profit inefficiency. Banks with higher percentage of fund from the cheapest source – deposit – are having lower profit inefficiency, which does make sense. Non-intinc_intinc is positively related to the profit inefficiency at the 10 percent significance level. The higher the market risk taking is, the higher the profit inefficiency is. Loan_deposit is positively related to the profit inefficiency at the 1 percent significance level. Loan_deposit proxies for the liquidity risk, thus, banks with higher liquidity risk tend to have higher profit inefficiency. E_TA is negatively related to the profit inefficiency. E_TA is the proxy for the capital risk or the capital adequacy. Therefore, the negative sign tells that banks with higher capital adequacy level will have lower profit inefficiencies.

Table A.3

GLS estimates of Eup (generated period by period by using the 3 sub-samples) on other factors

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	0.430 (0.558)	0.659 (0.104)	0.632 (0.394)	0.677 (0.376)
RGDPG	0.594 (0.295)			
INFLATION	-0.417 (0.557)			-1.678** (0.031)
CRISIS				-0.174*** (0.005)
POSTCRISIS				-0.062 (0.289)
LARGE	-0.237*** (0.000)		-0.200*** (0.000)	-0.188*** (0.000)
MEDIUM	-0.257*** (0.000)		-0.258*** (0.000)	-0.246*** (0.000)
PRIVATE	0.051 (0.199)		0.070 (0.146)	0.077 (0.118)
FOREIGN_OWNERSHIP	-0.372*** (0.001)		-0.357*** (0.001)	-0.326** (0.014)
LN_AGE	0.029 (0.109)		0.002 (0.921)	0.012 (0.554)
LOANPOWER	-0.004 (0.997)		0.029 (0.973)	0.785 (0.442)
E_TA		-0.893 (0.207)	-1.893** (0.025)	-1.499* (0.073)
DEPO_TL		-0.670 (0.119)	-0.288 (0.431)	-0.643* (0.065)
NONINTINC_INTINC		0.047 (0.595)	0.158* (0.076)	0.078 (0.385)
PROVISION_LOAN		0.183 (0.361)	0.092 (0.667)	0.285 (0.182)
LOAN_DEPOSIT		0.306*** (0.001)	0.224** (0.020)	
Adjusted R-squared	0.195	0.140	0.271	0.284

Note: The regression is generalized least squares (GLS) with White heteroskedasticity-consistent standard errors and covariance. Eup is expected profit inefficiency score; RGDPG is the annual real gross domestic product (GDP) growth rate; inflation is the annual inflation rate; crisis equals 1 if the bank observation is in the crisis period, 0 otherwise; postcrisis equals 1 if the bank observation is in the post crisis period, 0 otherwise; large equals 1 if the bank is one of the large banks, 0 otherwise; medium equals 1 if the bank is one of the medium-sized banks, 0 otherwise; private equals 1 if the bank is private-owned and 0 if the bank is government-owned; ln_age is the natural log of the age of the bank; foreignownership is the limit set by the bank that the highest percentage of the bank's shares can be owned by the foreigners; loanpower equals the total loans of the four large banks divided by the total loans of all Thai commercial banks; e_ta equals equity divided by total assets; depo_tl equals deposit divided by total liabilities; nonintinc_intinc equals the non-interest income divided by the interest income; provision_loan equals the provisions for the bad debts divided by the loans; loan_deposit is the loans divided by the deposits. p-values are in parentheses; *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

2. Eucv (expected cost inefficiency where the cost is the total variable costs) as the dependent variable

Table A.4 lists the GLS estimates of Eucv (based on the three sub-samples) on 15 other factors. When the dependent variable is Eucv instead of Eup, less variables become significant in different regressions at different significance levels. Large dummy is negatively related to the Eucv. Large banks have the lowest cost inefficiency, and small banks have the highest cost inefficiency level. Private dummy is negatively related to the cost inefficiency, which indicates that private-owned banks have the lower inefficiency level whereas government-owned banks have the higher cost inefficiency level.

DEPOSIT_TL is negatively related to cost inefficiency, which makes sense that the bank using more of the cheapest input (deposit) will have the higher cost efficiency. NONINTINC_INTINC is positively related to cost inefficiency. Higher non-interest income correlates with higher cost inefficiency. Since non-interest income proxies for the market risk, thus banks with higher market risk tend to have higher cost inefficiency. LOAN_DEPOSIT is negatively related to the cost inefficiency. Higher liquidity risk is correlated with lower cost inefficiency.

Provision_loan is negatively related to the cost inefficiency, but the coefficient is not significant. This variable is a proxy for the credit risk. The higher the credit risk, the lower the cost inefficiency is. Possible explanation is the “skimping” hypothesis that the less spending on screening and monitoring may lead to the higher credit risk (Berger and DeYoung, 1997).

Table A.4

GLS estimates of Eucv (generated period by period with 3 sub-samples) on other factors

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	0.184 (0.336)	0.406*** (0.000)	0.375 (0.106)	0.038 (0.828)
RGDPG	-0.050 (0.695)			
INFLATION	0.074 (0.725)			0.354 (0.114)
CRISIS				0.005 (0.788)
POSTCRISIS				0.030 (0.281)
LARGE	-0.019 (0.150)		-0.036* (0.065)	-0.029 (0.125)
MEDIUM	-0.011 (0.458)		-0.025 (0.213)	-0.024 (0.212)
PRIVATE	-0.038* (0.093)		-0.017 (0.438)	-0.030 (0.229)
FOREIGN_OWNERSHIP	0.024 (0.619)		-0.033 (0.530)	-0.025 (0.674)
LN_AGE	-0.021 (0.141)		-0.011 (0.423)	-0.018 (0.195)
LOANPOWER	-0.009 (0.971)		0.024 (0.933)	0.338 (0.217)
E_TA		-0.044 (0.869)	-0.212 (0.462)	-0.274 (0.366)
DEPO_TL		-0.226** (0.037)	-0.144 (0.164)	-0.115 (0.315)
NONINTINC_INTINC		0.068* (0.069)	0.092** (0.016)	0.110** (0.011)
PROVISION_LOAN		-0.004 (0.949)	-0.029 (0.724)	-0.050 (0.499)
LOAN_DEPOSIT		-0.180*** (0.000)	-0.137*** (0.003)	
Adjusted R-squared	0.122	0.235	0.275	0.236

Note: The regression is generalized least squares (GLS) with White heteroskedasticity-consistent standard errors and covariance. Eucv is expected cost inefficiency where the cost is total variable costs; RGDPG is the annual real gross domestic product (GDP) growth rate; inflation is the annual inflation rate; crisis equals 1 if the bank observation is in the crisis period, 0 otherwise; postcrisis equals 1 if the bank observation is in the post crisis period, 0 otherwise; large equals 1 if the bank is one of the large banks, 0 otherwise; medium equals 1 if the bank is one of the medium-sized banks, 0 otherwise; private equals 1 if the bank is private-owned and 0 if the bank is government-owned; ln_age is the natural log of the age of the bank; foreignownership is the limit set by the bank that the highest percentage of the bank's shares can be owned by the foreigners; loanpower equals the total loans of the four large banks divided by the total loans of all Thai commercial banks; e_ta equals equity divided by total assets; depo_tl equals deposit divided by total liabilities; nonintinc_intinc equals the non-interest income divided by the interest income; provision_loan equals the provisions for the bad debts divided by the loans; loan_deposit is the loans divided by the deposits. p-values are in parentheses; *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Inefficiency scores from the combination approach

The correlation analysis is done for the EupBCC (expected profit inefficiency scores generated by SFA with the BCC dummy) and EucvBCC (expected cost inefficiency scores generated by SFA with BCC dummy where the cost is the total variable costs) inefficiency scores. The dependent variable is EupBCC (generated by 3 sub-samples) and EucvBCC (generated by 3 sub-samples). The independent variables are the same as previous 15 variables. The GLS estimates are displayed in Table A.5 and A.6. The estimates are similar to the results from the parametric approach (comparing with Table A.3 and A.4).

Table A.5 shows the estimates where the dependent variable is EupBCC generated by 3 sub-samples. There are more significant variables when the inefficiency score is generated by the 3 sub-samples. Inflation, crisis, large, medium, foreignownership, E_TA and Depo_tl are significantly negatively related to the EupBCC at different significance levels. Loan_deposit and nonintinc_intinc are positively related to the EupBCC. The explanations are the same as the previous section when the Eup is the dependent variable.

The provision_loan is not significant in any regression. However, the signs of this variable are always positive. The higher the percentage of provision to loan, i.e., the poorer the quality of the loan portfolio is, the higher the profit inefficiency is.

Table A.6 presents the estimates of EucvBCC (expected cost inefficiency generated by SFA with BCC dummy where the cost is total variable costs) on other factors. Variables inflation, and nonintinc_intinc are positively related to the

EucvBCC at different significance levels. Variables private, depo-tl, and loan-deposit are negatively related to EucvBCC at different significance levels.

No conclusion can be drawn about the correlation between foreignownership and EucvBCC, or provision_loan and EucvBCC.

The expected cost inefficiency score (where the total variable cost is replaced by total cost)

The robustness test is also conducted through replacing the variable cost (total interest expenses plus personnel expenses) with the total cost (total interest expenses plus personnel expenses plus physical capital expenses) to generate the expected cost inefficiency Euc period by period (using three sub-samples: pre-crisis, crisis, and post-crisis periods). The resulting average Euc are displayed in panel A of Table A.7. For this period by period case, the average cost inefficiency is always increasing, from 5.82 percent in the pre-crisis period to 6.34 percent, and 10.82 percent in the post-crisis period. This leads to the conclusion that the average cost inefficiency for the post-crisis period is significantly higher than that of the pre-crisis period (see panel B of Table A.7). This conclusion is robust when it is compared with the results from the previous section (see Table A.1). The slight difference is that the average cost inefficiency for the crisis period generated by variable cost is higher than that generated by the total cost while the other two periods show the opposite.

The correlation analysis is also performed as the previous section. Table A.8 reports the estimates. The dependent variable in Table A.8 is Euc (expected cost inefficiency generated by SFA and three sub-samples). The signs and the significance

of the estimates are comparable to the previous part (see Table A.4 where the dependent variable is Eucv with three sub-samples). The results are robust. Variable significantly positively related to Euc is nonintinc_intinc. Variables significantly negatively related to Euc are large, and loan-deposit. Variable depo_tl is not significant in this case but the sign of the coefficient is still negative.

Table A.5

GLS estimates of EupBCC (generated period by period with 3 sub-samples) on other factors

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	0.330 (0.651)	0.626 (0.119)	0.542 (0.460)	0.662 (0.383)
RGDPG	0.692 (0.219)			
INFLATION	-0.387 (0.582)			-1.758** (0.023)
CRISIS				-0.184*** (0.003)
POSTCRISIS				-0.090 (0.108)
LARGE	-0.243*** (0.000)		-0.207*** (0.000)	-0.194*** (0.000)
MEDIUM	-0.265** (0.000)		-0.265*** (0.000)	-0.249*** (0.000)
PRIVATE	0.051 (0.176)		0.068 (0.141)	0.071 (0.129)
FOREIGN_OWNERSHIP	-0.372*** (0.001)		-0.356*** (0.000)	-0.302** (0.017)
LN_AGE	0.030* (0.088)		0.004 (0.839)	0.013 (0.515)
LOANPOWER	0.133 (0.900)		0.117 (0.891)	0.769 (0.449)
E_TA		-0.811 (0.259)	-1.802** (0.032)	-1.438* (0.081)
DEPO_TL		-0.658 (0.123)	-0.280 (0.435)	-0.615* (0.075)
NONINTINC_INTINC		0.043 (0.625)	0.157* (0.070)	0.093 (0.304)
PROVISION_LOAN		0.196 (0.328)	0.101 (0.635)	0.308 (0.144)
LOAN_DEPOSIT		0.321*** (0.001)	0.242** (0.012)	
Adjusted R-squared	0.211	0.146	0.284	0.298

Note: The regression is generalized least squares (GLS) with White heteroskedasticity-consistent standard errors and covariance. EupBCC is expected profit inefficiency score generated by the SFA with BCC dummy; RGDPG is the annual real gross domestic product (GDP) growth rate; inflation is the annual inflation rate; crisis equals 1 if the bank observation is in the crisis period, 0 otherwise; postcrisis equals 1 if the bank observation is in the post crisis period, 0 otherwise; large equals 1 if the bank is one of the large banks, 0 otherwise; medium equals 1 if the bank is one of the medium-sized banks, 0 otherwise; private equals 1 if the bank is private-owned and 0 if the bank is government-owned; ln_age is the natural log of the age of the bank; foreignownership is the limit set by the bank that the highest percentage of the bank's shares can be owned by the foreigners; loanpower equals the total loans of the four large banks divided by the total loans of all Thai commercial banks; e_ta equals equity divided by total assets; depo_tl equals deposit divided by total liabilities; nonintinc_intinc equals the non-interest income divided by the interest income; provision_loan equals the provisions for the bad debts divided by the loans; loan_deposit is the loans divided by the deposits. p-values are in parentheses; *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table A.6

GLS estimates of EucvBCC (generated period by period with 3 sub-samples) on other factors

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	0.176 (0.345)	0.392*** (0.000)	0.340 (0.130)	0.008 (0.962)
RGDPG	-0.059 (0.626)			
INFLATION	0.214 (0.293)			0.491** (0.021)
CRISIS				0.002 (0.903)
POSTCRISIS				0.034 (0.207)
LARGE	-0.013 (0.308)		-0.027 (0.140)	-0.021 (0.233)
MEDIUM	-0.006 (0.659)		-0.020 (0.281)	-0.019 (0.282)
PRIVATE	-0.037* (0.090)		-0.017 (0.444)	-0.028 (0.227)
FOREIGN_OWNERSHIP	0.032 (0.480)		-0.031 (0.544)	-0.022 (0.703)
LN_AGE	-0.020 (0.162)		-0.009 (0.478)	-0.016 (0.237)
LOANPOWER	-0.022 (0.929)		0.077 (0.781)	0.415 (0.123)
E_TA		-0.058 (0.826)	-0.191 (0.501)	-0.265 (0.368)
DEPO_TL		-0.236** (0.024)	-0.176* (0.083)	-0.162 (0.150)
NONINTINC_INTINC		0.081** (0.025)	0.100*** (0.009)	0.113*** (0.009)
PROVISION_LOAN		-0.017 (0.778)	-0.039 (0.606)	-0.067 (0.310)
LOAN_DEPOSIT		-0.158*** (0.001)	-0.122*** (0.004)	
Adjusted R-squared	0.105805	0.231	0.260	0.239

Note: The regression is generalized least squares (GLS) with White heteroskedasticity-consistent standard errors and covariance. EucvBCC is expected cost inefficiency score generated by SFA with BCC dummy where the cost is total variable costs; RGDPG is the annual real gross domestic product (GDP) growth rate; inflation is the annual inflation rate; crisis equals 1 if the bank observation is in the crisis period, 0 otherwise; postcrisis equals 1 if the bank observation is in the post crisis period, 0 otherwise; large equals 1 if the bank is one of the large banks, 0 otherwise; medium equals 1 if the bank is one of the medium-sized banks, 0 otherwise; private equals 1 if the bank is private-owned and 0 if the bank is government-owned; ln_age is the natural log of the age of the bank; foreignownership is the limit set by the bank that the highest percentage of the bank's shares can be owned by the foreigners; loanpower equals the total loans of the four large banks divided by the total loans of all Thai commercial banks; e_ta equals equity divided by total assets; depo_tl equals deposit divided by total liabilities; nonintinc_intinc equals the non-interest income divided by the interest income; provision_loan equals the provisions for the bad debts divided by the loans; loan_deposit is the loans divided by the deposits. p-values are in parentheses; *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table A.7

Annual average Euc (generated period by period by Stochastic Frontier Approach
where the cost is the total cost)

	Year	Annual average Euc
Panel A: inefficiency scores		
Pre-crisis period	1990	0.0489
	1991	0.0328
	1992	0.0572
	1993	0.0858
	1994	0.0959
	1995	0.0502
	1996	0.0365
	Mean	0.0582
Crisis period	1997	0.0318
	1998	0.0849
	1999	0.0522
	2000	0.0845
	Mean	0.0634
Post-crisis period	2001	0.0860
	2002	0.0818
	2003	0.0754
	2004	0.1466
	2005	0.1512
	Mean	0.1082
Panel B: t-test of equal means		
Pre-crisis vs. crisis period		-0.327 (0.377)
Crisis vs. post-crisis period		-2.117** (0.036)
Pre-crisis vs. post-crisis period		-2.631** (0.020)

Note: Euc is expected cost inefficiency score where the cost is total costs; The inefficiency scores are generated by three sub-samples: the pre-crisis sample is from 1990 to 1996 with 104 observations; the crisis sample is from year 1997 to 2000 with 49 observations; and the post-crisis sample is from year 2001 to 2005 with 62 observations. Panel B lists the t-statistics of each t-test of two equal means, and the p-values are in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table A.8

GLS estimates of Euc (generated period by period with 3 sub-samples) on other factors

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	0.091 (0.644)	0.364*** (0.001)	0.357 (0.150)	-0.042 (0.822)
RGDPG	0.035 (0.802)			
INFLATION	0.131 (0.569)			0.382 (0.114)
CRISIS				-0.001 (0.945)
POSTCRISIS				0.032 (0.298)
LARGE	-0.028* (0.057)		-0.048** (0.022)	-0.040* (0.058)
MEDIUM	-0.018 (0.330)		-0.035 (0.146)	-0.032 (0.168)
PRIVATE	-0.030 (0.165)		-0.005 (0.821)	-0.019 (0.406)
FOREIGN_OWNERSHIP	0.031 (0.566)		-0.027 (0.638)	-0.017 (0.802)
LN_AGE	-0.016 (0.194)		-0.008 (0.487)	-0.016 (0.204)
LOANPOWER	0.099 (0.722)		0.005 (0.987)	0.384 (0.185)
E_TA		-0.101 (0.699)	-0.322 (0.247)	-0.357 (0.223)
DEPO_TL		-0.165 (0.109)	-0.094 (0.365)	-0.056 (0.627)
NONINTINC_INTINC		0.042 (0.233)	0.066* (0.076)	0.089** (0.041)
PROVISION_LOAN		-0.006 (0.933)	-0.027 (0.742)	-0.055 (0.508)
LOAN_DEPOSIT		-0.175*** (0.000)	-0.149*** (0.003)	
Adjusted R-squared	0.141	0.234	0.275	0.239

Note: The regression is generalized least squares (GLS) with White heteroskedasticity-consistent standard errors and covariance. Euc is expected cost inefficiency score where the cost is total costs; RGDPG is the annual real gross domestic product (GDP) growth rate; inflation is the annual inflation rate; crisis equals 1 if the bank observation is in the crisis period, 0 otherwise; postcrisis equals 1 if the bank observation is in the post crisis period, 0 otherwise; large equals 1 if the bank is one of the large banks, 0 otherwise; medium equals 1 if the bank is one of the medium-sized banks, 0 otherwise; private equals 1 if the bank is private-owned and 0 if the bank is government-owned; ln_age is the natural log of the age of the bank; foreignownership is the limit set by the bank that the highest percentage of the bank's shares can be owned by the foreigners; loanpower equals the total loans of the four large banks divided by the total loans of all Thai commercial banks; e_ta equals equity divided by total assets; depo_tl equals deposit divided by total liabilities; nonintinc_intinc equals the non-interest income divided by the interest income; provision_loan equals the provisions for the bad debts divided by the loans; loan_deposit is the loans divided by the deposits. p-values are in parentheses; *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.