Chapter 4

Methodology and Data

The focus of this paper is applying different frontier approaches to measure the efficiency of Thai commercial banks during the period from 1990 to 2005, which consists the pre-crisis, financial crisis, and post-crisis sub-periods. Then the inefficiency or efficiency scores of commercial banks of the three periods will be compared, especially between pre-crisis and post-crisis periods, to show whether financial reforms are effective and whether the commercial banks are learning some lessons from the crisis.

The full sample period is from 1990 to 2005, which can be further divided into three sub-periods: the pre-crisis period, 1990-1996; the financial crisis period, 1997-2000; and the post-crisis period, 2001-2005.

I.   Inefficiency score measurement by the parametric approach

Obviously, based on objectives of the study and characteristics of the sample, both distribution-free approach (DFA) and thick frontier approach (TFA) are not suitable for this paper. Because the sample size is relatively small, the efficiency of Thai commercial banks is expected to change over time, and individual bank's efficiency ratio is preferred to the general level of overall efficiency. Therefore, the stochastic frontier approach (SFA) is chosen for the study.

First, the cost inefficiency of Thai commercial banks will be measured to compare how efficiently each bank utilizes their inputs. The comparison will be done across the banks and across the time periods. It is argued that the profit efficiency concept is superior to the cost efficiency since it can evaluate the overall performance of the bank (Berger and Mester, 1997). Therefore, profit inefficiency will also be measured for the Thai commercial banks. However, the alternative profit efficiency will be applied instead of the standard profit efficiency concept since some underlying assumptions of the standard profit efficiency concept are not held for Thai commercial banks. For instance: 1) Outputs are not completely variable for a Thai commercial bank, i.e., it cannot achieve every scale and product mix. This can be seen from the fact that Thai commercial banks can always be easily divided into three size (large, medium, and small) groups based on their assets and income. Each bank stays in the same size group throughout the full sample period. 2) Output markets are not completely competitive, large banks have some market power over the prices they charge. Throughout the full sample period, the large group (four banks: Bangkok Bank Public Company Limited, The Siam Commercial Bank Public Company Limited, Kasikornbank Public Company Limited, and Krung Thai Bank Public Company Limited) always has the loan market share of over 60 percent. 3) Output prices are not available or accurately measured for Thai commercial banks.

The functional form is modified from the preferred specifications in Berger and Mester (1997), which was a global approximation that includes a standard translog plus Fourier trigonometric terms. It was shown that the Fourier-flexible efficiency estimates were likely more accurate, but the improvement in fit was not significant from an economic point of view (Berger and Mester, 1997). Both translog

and Fourier-flexible forms yielded the same average level and dispersion of measured efficiency. Since the sample size of Thai commercial banks in this paper is too small for the Fourier trigonometric specification, coefficients of all trigonometric terms are restricted to be zero. Further, their empirical result indicated that the treatment of non-performing loans (NPLs) was not materially important to efficiency estimates. Therefore, this study uses other exogenous factors to replace the NPL factor: crisis dummy and post-crisis dummy.

Hence, the cost function is specified as follows:

$$\ln(C/w_2 z_2) = \alpha + \beta_1 \ln(w_1/w_2) + \frac{1}{2}\beta_2(\ln(w_1/w_2))^2 + \sum_{k=1}^{2}\gamma_k \ln(y_k/z_2)$$

$$+\frac{1}{2}\sum_{k=1}^{2}\sum_{m=1}^{2}\gamma_{mk}\ln(y_k/z_2)\ln(y_m/z_2)+\delta_1\ln(z_1/z_2)+\frac{1}{2}\delta_2(\ln(z_1/z_2))^2$$

$$+\sum_{k=1}^{2}\eta_k\ln(w_1/w_2)\ln(y_k/z_2)+\rho_1\ln(w_1/w_2)\ln(z_1/z_2)+\sum_{k=1}^{2}\tau_k\ln(y_k/z_2)\ln(z_1/z_2)$$

$$+\phi_1 crisis + \phi_2 postcrisis + v_c + u_c$$

And the alternative profit function is specified as follows:

$$\ln(\pi/w_2 z_2 + \theta) = \alpha + \beta_1 \ln(w_1/w_2) + \frac{1}{2}\beta_2(\ln(w_1/w_2))^2 + \sum_{k=1}^{2}\gamma_k \ln(y_k/z_2)$$

$$+\frac{1}{2}\sum_{k=1}^{2}\sum_{m=1}^{2}\gamma_{mk}\ln(y_k/z_2)\ln(y_m/z_2)+\delta_1\ln(z_1/z_2)+\frac{1}{2}\delta_2(\ln(z_1/z_2))^2$$

$$+\sum_{k=1}^{2}\eta_k\ln(w_1/w_2)\ln(y_k/z_2)+\rho_1\ln(w_1/w_2)\ln(z_1/z_2)+\sum_{k=1}^{2}\tau_k\ln(y_k/z_2)\ln(z_1/z_2)$$

$$+\phi_1 crisis + \phi_2 postcrisis + v_p - u_p$$

The definitions of each variable are detailed in Table 4.1.

Where u_{ci} and u_{pi} are cost inefficiency and profit inefficiency of the bank i, only the expected cost inefficiency and profit inefficiency can be computed as Eucv$_i$ and Eup$_i$ following the method introduced by Jondrow et al. (1982).

Table 4.1

Definitions of variables used in SFA

Variable	Definition and details
C	Total variable cost; C = total interest expense + personnel expense
w_1	Price of input 1; which is equal to total interest expenses divided by total liabilities
w_2	Price of input 2; which is personnel expenses divided by number of employees
y_1	Output 1; loans, net of allowances for doubtful accounts
y_2	Output 2; total other earning assets, which is total earning assets minus loans
z_1	Fixed netput 1; physical capital
z_2	Fixed netput 2; equity
crisis	Dummy variable 1; it equals 1 if the bank observation is in the crisis period; it equals 0 otherwise
postcrisis	Dummy variable 2; it equals 1 if the bank observation is in the post-crisis period; it equals 0 otherwise
π	Net profit;
θ	Constant; $\theta = |(\pi/w_2 z_2)_{min}|+1$; If the minimum $\pi/w_2 z_2$ is nonpositive (which is often for the crisis period), then θ is added to each bank's net profit to avoid that the natural log is taken of a nonpositive number.
v_c, v_p	Random error terms; they are assumed to have the normal distribution.
u_c	Inefficiency factor; which will increase the total cost above the best practice level, also named as cost inefficiency score. It is assumed to have the half-normal distribution.
u_p	Inefficiency factor; which will reduce the net profit below the best practice level, also named as profit inefficiency score. It is assumed to have the half-normal distribution.

II.   <u>**Efficiency score measurement by the non-parametric approach**</u>

This study will apply two data envelopment analysis (DEA) models CCR and BCC, and free disposal hull (FDH) to measure the efficiency of Thai commercial banks. Based on the intermediation approach (Sealey and Lindley, 1977), three inputs and two outputs are selected to run the linear programming model. Three inputs are total interest expenses, personnel expenses, and physical capital expenses. Two outputs are loans (net of allowances for doubtful accounts) and other earning assets (total earning assets minus loans). Each bank's three efficiency scores are measured annually. Thus, efficiency score of 1 represents the best-practice bank during the year.

The linear programming model for CCR efficiency score is as follows, and measuring the efficiency of N banks is a set of N following linear programming problems:

CCR model:

$$\min \quad \theta_{CCR}$$

$$subject \ \ to \quad \sum_{n=1}^{N} x_{in} \lambda_n \le \theta_{CCR} x_{iD} \quad i = 1, 2, 3$$

$$\sum_{n=1}^{N} y_{jn} \lambda_n \ge y_{jD} \quad\quad j = 1, 2$$

$$\lambda_n \ge 0 \quad\quad\quad n = 1, ..., N$$

where θ_{CCR} is the CCR efficiency score of bank D; x_{in} is the ith input of the nth bank; y_{jn} represents the jth output of the nth bank; N is the number of banks observed in a year, which is ranged from 11 to 15; and D represents the bank that is being studied.

Similarly, the other two models are as follows:

BCC model:

$$\min \quad \theta_{BCC}$$

$$subject \ to \quad \sum_{n=1}^{N} x_{in}\lambda_n \leq \theta_{BCC} x_{iD} \quad i=1,2,3$$

$$\sum_{n=1}^{N} y_{jn}\lambda_n \geq y_{jD} \quad j=1,2$$

$$\sum_{n=1}^{N} \lambda_n = 1 \quad n=1,...,N$$

$$\lambda_n \geq 0 \quad n=1,...,N$$

FDH model:

$$\min \quad \theta_{FDH}$$

$$subject \ to \quad \sum_{n=1}^{N} x_{in}\lambda_n \leq \theta_{FDH} x_{iD} \quad i=1,2,3$$

$$\sum_{n=1}^{N} y_{jn}\lambda_n \geq y_{jD} \quad j=1,2$$

$$\sum_{n=1}^{N} \lambda_n = 1 \quad n=1,...,N$$

$$\lambda_n \in (0,1) \quad n=1,...,N$$

Further, the author attempts to measure the bank's efficiency score from a different dimension. The above mentioned measurement is to compare the bank with the best-practice bank in the Thai commercial banking industry during the year, which can be called horizontal measurement. The other dimension is vertical measurement, which means that the bank is compared with itself across different years. If the same bank is observed covering both pre-crisis and post-crisis periods, then the same bank observations are pooled together to run the linear programming model.

III. <u>Inefficiency score measurement by the combination approach</u>

In this section, the profit and cost inefficiency scores for each bank will be generated through the method of combining the parametric and non-parametric approaches. The stochastic frontier analysis (SFA) is chosen for the parametric approach, and data envelopment analysis (DEA) is chosen for the non-parametric approach. DEA will use CCR and BCC models. The free disposal hull (FDH) is not considered here because there are 209 out of 215 bank observations having FDH efficiency score of 1. Thus, the FDH dummy will not make expected profit or cost inefficiencies (Eup or Eucv) different much from the previous results of stochastic frontier approach.

The combined method will follow the DEA-dummy variable approach such as Arnold et al. (1996). The difference is that decision making units (DMUs) were public secondary schools in Texas in their study, whereas the Thai commercial banks are the DMUs in this paper. Hence, the inputs, outputs and other variables are different in the analysis. Two dummy variables are introduced in this study. One is the CCR dummy, it is equal to 1 if the bank's CCR efficiency score is 1 and it is equal to 0 otherwise. The other dummy is BCC, it is equal to 1 if the bank's BCC efficiency score is 1 and it is equal to 0 otherwise. The CCR or BCC dummy will be added to the SFA specification to generate the expected profit or cost inefficiency scores. The added dummy is assumed to help to generate a more accurate frontier, hence more accurate efficiency scores. However, since the real functional form of the frontier is not known, it is difficult to conclude how accurate the efficiency scores are.

For instance, the cost function adding CCR dummy is specified as follows.

$$\ln(C/w_2 z_2) = \alpha + \beta_1 \ln(w_1/w_2) + \frac{1}{2}\beta_2(\ln(w_1/w_2))^2 + \sum_{k=1}^{2}\gamma_k \ln(y_k/z_2)$$

$$+ \frac{1}{2}\sum_{k=1}^{2}\sum_{m=1}^{2}\gamma_{mk}\ln(y_k/z_2)\ln(y_m/z_2) + \delta_1\ln(z_1/z_2) + \frac{1}{2}\delta_2(\ln(z_1/z_2))^2$$

$$+ \sum_{k=1}^{2}\eta_k\ln(w_1/w_2)\ln(y_k/z_2) + \rho_1\ln(w_1/w_2)\ln(z_1/z_2) + \sum_{k=1}^{2}\tau_k\ln(y_k/z_2)\ln(z_1/z_2)$$

$$+ \phi_1 crisis + \phi_2 postcrisis + \phi_3 CCR + v_c + u_c$$

Only the intercept dummy is added into the SFA specification. The interaction terms are not added because the sample size is relatively small in this paper.

The cost function adding BCC dummy, the alternative profit function adding CCR dummy, and the alternative profit function adding BCC dummy are constructed in a similar way. The expected cost and profit inefficiency scores for the above four functional forms will be defined as EucvCCR, EucvBCC, EupCCR, and EupBCC.

IV.   Comparison of inefficiency/efficiency scores

After parametric (SFA), non-parametric (DEA and FDH), and combined parametric and non-parametric approaches are employed to measure Thai commercial banks' inefficiency or efficiency, it is of interest to compare the results among the three approaches.

Since SFA measures the inefficiency, and DEA measures the efficiency of the bank, it is necessary to convert SFA inefficiency scores to SFA efficiency scores before the comparison can be made. To compute SFA cost and profit efficiency scores, the following method is used (modified from Berger and Mester, 1997):

$$Cost\ Efficiency_D = \frac{\hat{C}_{min}}{\hat{C}_D} = \frac{w_2 z_2 \exp(\hat{f}_D) \exp(Eucv_{min})}{w_2 z_2 \exp(\hat{f}_D) \exp(Eucv_D)}$$

$$= \frac{\exp(Eucv_{min})}{\exp(Eucv_D)}$$

$$Pr\ ofit\ Efficiency_D = \frac{\hat{\pi}_D}{\hat{\pi}_{max}}$$

$$= \frac{w_2 z_2 [\exp(\hat{f}_D) \exp(-Eup_D) - \theta]}{w_2 z_2 [\exp(\hat{f}_D) \exp(-Eup_{min}) - \theta]}$$

$$= \frac{\exp(\hat{f}_D) \exp(-Eup_D) - \theta}{\exp(\hat{f}_D) \exp(-Eup_{min}) - \theta}$$

where: the subscript "D" stands for the bank that is being studied; "∧" stands for the predicted value; "f" stands for the cost or profit function; $Eucv_{min}$ and Eup_{min} are the minimum Eucv (cost inefficiency) and Eup (profit inefficiency) across all the bank observations during the year.

The cost and profit efficiency ratios are now comparable to the DEA efficiency scores. The cost efficiency ratio can be thought of as the proportion of the inputs that is utilized efficiently. The range of cost efficiency ratios is (0, 1], and "1" is the cost efficiency of the best-practice bank during the year. The profit efficiency ratio can be thought of as the proportion of the maximum potential profit that is earned by the bank. The profit efficiency ratio equals 1 for the best-practice bank during the year. However, since a bank can lose more than 100 percent of its maximum potential profit, the profit efficiency ratio for the bank can be negative.

V.   <u>Correlated factors</u>

After the inefficiency or efficiency scores are obtained, the correlation analysis is applied in an attempt to explain the variation of inefficiency/efficiency scores among banks. It is not intended to define the determinants of the inefficiency/efficiency score, rather the correlation is emphasized.

The correlation analysis will utilize the generalized least squares model. The dependent variable is inefficiency or efficiency score. There are altogether 15 independent variables which are considered to have the correlation with the Thai commercial bank' efficiency.   They can be divided into 3 groups as follows:

The first group is exogenous macroeconomic environmental factors:

1) rgdpg: annual real Gross Domestic Product (GDP) growth rate

2) crisis: dummy for crisis period; it is equal to 1 if the bank observation is in the crisis period, it is equal to 0 otherwise.

3) postcrisis: dummy for the post-crisis period; it is equal to 1 if the bank observation is in the post-crisis period, it is equal to 0 otherwise.

4) inflation: annual inflation; it is computed from the GDP deflator.

The rgdpg and crisis variables can also be found in Narongtanupon (2000). Whereas 3) and 4) are newly introduced in this paper. Postcrisis dummy is included besides the crisis dummy because this study divides the full sample period into three sub-periods: pre-crisis, crisis, and post-crisis periods, whereas other studies divide the full sample into only two sub-periods: pre-crisis and crisis periods. Inflation is included to take into account the special environmental condition during the crisis period when the inflation was once higher than 9 percent in 1998.

The second group is bank general characteristics and the banking industry level economic factor (or the market power of the large bank):

5) large: dummy for large banks; it is equal to 1 if the bank is one of the large banks (classified by the asset size of the bank). It is equal to 0 otherwise.

6) medium: dummy for the medium-sized banks; it is equal to 1 if the bank is one of the medium-sized banks. It is equal to 0 otherwise.

7) private: dummy variable; it is equal to 1 if the bank is private-owned and 0 if the bank is government-owned.

8) ln_age: the natural log of the age of the bank

9) foreignownership: it is the limit set by the bank that the highest percentage of the bank's shares can be owned by the foreigners.

10) loanpower: it is the ratio of total loans of the four large banks to total loans of all Thai commercial banks. It is the proxy for the competition level of the Thai commercial banking and the market power of large banks.

Variables large, medium, private, ln_age, and loanpower are similar to those (they may appear in different names) in previous papers such as William and Nguyen (2005), Narongtanupon (2000), Kwan (2006), Mester (1996), Berger and Mester (1997), and DeYoung and Hasan (1998). The new variable introduced in this paper is the foreignownership. It is included in this study because the foreign ownership of Thai commercial banks changed dramatically after the financial crisis, which is considered to have the correlation with the efficiency.

The third group consists of the specific financial characteristics and risk proxies of the bank:

11) e_ta: equity ratio, it is equal to equity divided by total assets. It is the proxy for the capital risk of the bank.

12) depo_tl: it is equal to deposit divided by total liabilities. It is the percentage of the cheapest input.

13) nonintinc_intinc: it is the ratio of the non-interest income to interest income. It is the proxy for the bank's non-traditional activities or the market risk taking.

14) provision_loan: it is equal to the provisions for the bad debts divided by the loans. It is the proxy for the credit risk of the bank.

15) loan_deposit: it equals the loans divided by the deposits. It is the proxy for the liquidity risk of the bank.

These variables, except the nonintinc_intinc, are popular among the researchers, such as Mester (1993), Narongtanupon (2000), Kwan (2006), and etc. However, they may be given different names or used for different purposes. The variable nonintinc_intinc is newly introduced in this paper to reflect the Thai commercial banks' higher market risk taking after the financial crisis.

VI.   Data

The financial data is taken from each bank's annual financial statements, which are compiled from the Commercial Banks in Thailand (Bank of Thailand, 1992-1995; Bangkok Bank, 1990-2006), the I-SIMS CDs and the website page www.setsmart.com. The environmental factors are obtained from the International Financial Statistics (International Monetary Fund, 1999; 2003; 2006).

The year end balance sheet items are collected from year 1989 to 2005, then the year averages of each item of each bank are computed from its beginning and ending balances. The year averages of each balance sheet item, instead of the year end balances, of each bank will be used in this study. The income statement items and other variables are collected from year 1990 to 2005. Thus the full sample is from year 1990 to 2005. There are altogether 222 bank year observations. Since the financial statements of the Bangkok Bank of Commerce Public Company Limited are suspicious for a few years before its bankruptcy, the year 1996, 1997, and 1998 observations of this bank are deleted from the sample. Further, there are 4 bank year observations with negative equity: the Bangkok Metropolitan Bank Public Company Limited in year 1998, 1999, and 2000; the BankThai Public Company Limited in year 1998. They are also deleted from the sample since it is difficult to interpret financial statements ratios with negative equity. Therefore, the full sample consists of 215 bank year observations.

All of the financial data have been inflation adjusted by the GDP deflator (where the base year is 1988). Then the full sample is divided into three sub-samples: the pre-crisis period from 1990 to 1996 with 104 bank year observations; the financial crisis period from year 1997 to 2000 with 49 bank year observations; and the post-crisis period from year 2001 to 2005 with 62 bank year observations.

Banks can be easily divided into three groups based on their total asset size annually: large, medium, and small. Table 4.2 shows the names and abbreviations of each bank organized by the total asset size groups. There are 4 large, 5 medium, and 14 small banks in the sample. Each bank tends to be in the same size group across years.

The cutoff points are displayed in Table 4.3. Annual total assets and net incomes of each group are also in Table 4.3.

It can be seen from Table 4.3 that the total assets cutoff points are increasing year by year for the pre-crisis period. The cutoff point of the large and medium groups is increased from 100,000 million Baht in year 1990 to 330,000 million Baht in year 1996. The cutoff point of the medium and small groups is increased from 55,000 million Baht in year 1990 to 130,000 million Baht in year 1996. This indicates that all of the Thai commercial banks are growing year by year during the pre-crisis period. The 1996 total assets of all banks, large, medium, and small groups are about double the 1990 amounts. However, the cutoff points are stabilized at 400,000 million Baht and 130,000 million Baht for the financial crisis period and the post-crisis period, respectively. This indicates that the sizes of each bank group are getting stabilized or not growing much from year 1997 to year 2005. In fact, the average total assets of small banks are decreased from 340 billion Baht in the crisis period to 253 billion Baht in the post-crisis period. The total assets of four large banks always dominate that of the other groups. It is 64 percent of the total assets of all Thai commercial banks in the pre-crisis period, and it is increased to 68 and 65 percent in the crisis period and post-crisis period respectively. The share of medium banks is increased by 5 percent after the financial crisis. And the share of small banks is decreased from 14 percent in the pre-crisis period to 10 and 7 percent in the crisis and post-crisis periods respectively. This could imply that the large- and medium-sized banks can cope with the crisis better than the small-sized banks can.

After the banks are grouped by their total assets, the total net incomes of each group are computed. The second part of Table 4.3 shows the results. The total net

income for each group is increasing steadily from year 1990 to 1995. The interesting point is that the large banks are earning more (71 percent of total net incomes of all Thai commercial banks) than the other groups (22 percent and 7 percent for the medium and small groups respectively) during the pre-crisis period, meanwhile they are losing much more than the other groups during the crisis period (year 1998 and 1999). Also they are the first ones to recover from the crisis and start to have the positive net income. By the end of year 2005 (post-crisis), large and medium groups' total net income levels are about the same as year 1996 (pre-crisis). But the percentages of total are changed. The large and medium banks' shares of total net incomes are decreased to 61 percent and 21 percent respectively in the post-crisis period, whereas the small group's share is increased to 18 percent. This could indicate that small banks are working more effectively on improving their net incomes although their assets' share is decreased.

Table 4.2

Names and abbreviations of banks in three size (by total assets) groups

Size	Name of the bank	Abbreviation of the bank	Years of observation
Large	Bangkok Bank Public Company Limited	BBL	1990-2005
	Kasikornbank Public Company Limited	KBANK	1990-2005
	Krung Thai Bank Public Company Limited	KTB	1990-2005
	The Siam Commercial Bank Public Company Limited	SCB	1990-2005
Medium	Bank of Ayudhya Public Company Limited	BAY	1990-2005
	TMB Bank Public Company Limited	TMB	1990-2005
	First Bangkok City Bank Public Company Limited	FBCB	1990-1997
	Siam City Bank Public Company Limited	SCIB	1990-2005
	BankThai Public Company Limited	BT	1999-2005
Small	The Bangkok Bank of Commerce Public Company Limited	BBC	1990-1995
	Bangkok Metropolitan Bank Public Company Limited	BMB	1990-1997, 2001
	Bank of Asia Public Company Limited	BOA	1990-2004
	The Union Bank of Bangkok Public Company Limited	UB	1990-1997
	Thai Danu Bank Public Company Limited	TDB	1990-1997
	Nakornthon Bank Public Company Limited	NTB	1990-1998
	Laem Thong Bank Public Company Limited	LTB	1990-1997
	The DBS Thai Danu Bank Public Company Limited	DTDB	1998-2003
	Radanasin Bank Public Company Limited	RSB	1998
	Standard Chartered Nakornthon Bank Public Company Limited	SCNB	1999-2004
	UOB Radanasin Bank Public Company Limited	UOBR	1999-2004
	Thanachart Bank Public Company Limited	TBANK	2002-2005
	Standard Chartered Bank (Thai) Public Company Limited	SCBT	2005
	United Overseas Bank (Thai) Public Company Limited	UOBT	2005

Table 4.3

Annual total assets[1] and net incomes[1] of each group (All, Large, Medium, and Small[2])

Year	Total assets (Millions of Baht)									Net income (Millions of Baht)						
	All banks	Large	%[3]	Cutoff1[4]	Medium	%	Cutoff2[5]	Small	%	All banks	Large	%	Medium	%	Small	%
Pre-crisis period																
1990	1,483,623	981,878	66	100,000	296,002	20	55,000	205,742	14	13,823	9,797	71	3,206	23	819	6
1991	1,730,176	1,138,979	66	150,000	350,782	20	64,000	240,416	14	16,401	12,249	75	3,285	20	867	5
1992	1,945,124	1,264,528	65	200,000	407,810	21	74,000	272,786	14	25,027	18,366	73	5,028	20	1,633	7
1993	2,220,331	1,421,655	64	230,000	479,129	22	88,000	319,546	14	34,189	24,217	71	7,539	22	2,432	7
1994	2,536,085	1,599,483	63	250,000	567,580	22	100,000	369,023	15	44,449	31,264	70	9,400	21	3,785	9
1995	2,890,016	1,777,082	61	280,000	677,998	23	120,000	434,935	15	54,177	39,215	72	10,775	20	4,187	8
1996	3,109,842	1,952,418	63	330,000	779,585	25	130,000	377,839	12	50,735	35,109	69	12,189	24	3,438	7
Average	**2,273,599**	**1,448,003**	**64**		**508,412**	**22**		**317,184**	**14**	**34,114**	**24,317**	**71**	**7,346**	**22**	**2,452**	**7**
Crisis period																
1997	3,494,082	2,198,473	63	400,000	878,683	25	130,000	416,926	12	-38,929	5,365	-[6]	-27,354	-	-16,940	-
1998	3,119,606	2,216,427	71	400,000	675,829	22	130,000	227,350	7	-159,308	-101,346	-	-35,551	-	-22,411	-
1999	3,281,488	2,271,062	69	400,000	670,666	20	130,000	339,760	10	-198,604	-156,338	-	-20,189	-	-22,077	-
2000	3,236,361	2,227,471	69	400,000	633,677	20	130,000	375,213	12	-1,647	38,134	-	-24,407	-	-15,374	-
Average	**3,282,884**	**2,228,358**	**68**		**714,714**	**22**		**339,813**	**10**	**-99,622**	**-53,546**	**-**	**-26,875**	**-**	**-19,201**	**-**
Post-crisis period																
2001	3,340,983	2,219,853	66	400,000	789,163	24	130,000	331,968	10	51,884	2,084	4	22,233	43	27,567	53
2002	3,342,158	2,213,148	66	400,000	888,561	27	130,000	240,449	7	7,030	5,040	72	3,586	51	-1,596	-23
2003	3,477,557	2,275,931	65	400,000	946,450	27	130,000	255,177	7	24,004	27,660	115	-6,607	-28	2,951	12
2004	3,519,955	2,313,467	66	400,000	1,008,984	29	130,000	197,505	6	43,195	35,376	82	6,554	15	1,265	3
2005	3,580,351	2,252,229	63	400,000	1,086,912	30	130,000	241,210	7	48,687	35,781	73	11,194	23	1,712	4
Average	**3,452,201**	**2,254,925**	**65**		**944,014**	**27**		**253,262**	**7**	**34,960**	**21,188**	**61**	**7,392**	**21**	**6,380**	**18**

Note: 1. All of the data are inflation adjusted by the GDP deflator (the base year is 1988). 2. Large, medium, and small groups are classified by the size of total assets. 3. % is each group's share of total assets of all banks. 4. Cutoff1 is the cutoff point of large and medium banks. If the bank's total assets is greater than the cutoff1, then it is classified as large bank. 5. Cutoff2 is the cutoff point of medium and small banks. If the bank's total assets is smaller than the cutoff2, then it is classified as a small bank, otherwise it is a medium bank. 6. The percentage is not provided since the total net income of all banks is negative.