Profit and Cost Efficiency of Philippine Commercial Banks Under Periods of Liberalization, Crisis and Consolidation*

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ABSTRACT

This paper examines the profit and cost efficiency of commercial banks in the Philippines from 1992-2004—covering periods of financial liberalization, crisis and consolidation. Two-stage procedure is employed. The first method involves the estimation of profit and cost efficiency using the stochastic frontier approach. Results indicate that profit efficiency slowly decreased from a mean score of 92% in 1992 to 84% in 2004 while cost inefficiency hovers around 11% to 12% from 1992 to 1998, and then jumps to 14% to 15% from 1998 to 2004. Efficiencies are found to be inversely related to asset size. Off-balance sheet services are found to be cost-absorbing, and substitute for traditional banking products. Elasticities of the prices of labor and deposits are found to be negative, providing evidence for the use of more and low-cost labor and the abundance of deposits as cheap source of funds. In the second stage, regression shows profit efficiency scores of universal banks are significantly higher than plain commercial banks, suggesting scope economies from expanded and equity investment activities of universal banks. Foreign banks are more cost inefficient due to higher personnel cost. Modest improvement in bank efficiency after liberalization in 1994 is registered but cost inefficiency increased in the aftermath of the Asian financial crisis. Acquired banks in mergers are not necessarily inefficient, and the weighted efficiency scores of the acquired and surviving banks before the merger have not improved three years after the merger, suggesting that synergy gains need a longer time to be realized.

INTRODUCTION

The paper aims to examine the profit and cost efficiency of Philippine commercial banks from 1992 to 2004, spanning three episodes that represent substantial metamorphosis for the Philippine banking sector in the past decade. These are the financial liberalization in 1994; the Asian currency and financial crisis in 1997; and, the wave of mergers and consolidation from 1998-2004. In 1994, the Philippines passed legislation (Republic Act No. 7721) liberalizing the sector which resulted in the entry of ten foreign banks in 1995. In 1994, the share of the foreign banks in terms of total assets of the commercial banking sector was 8.6%. By 2004, ten years after financial liberalization, foreign banks' share of the total assets of the sector nearly doubled to 17.05%. Liberalization contributed to the thinning of bank interest spreads with positive welfare effects (Unite and Sullivan, 2003), yet it also contributed to vulnerabilities of the financial system and even led to crises (Demirgüç-Kunt and Detragiache, 1998; Mehrez and Kaufman, 2000). Officially, the onset of the Asian financial crisis was marked by the devaluation of the Thai baht on July 2, 1997 which was followed by a more freely float of the Philippine peso on July 11, 1997 and its depreciation by 40% three months after. The literature characterized financial crises by currency (balance of payment) and banking crises, with a possible two-way direction of causation between the two as they can result from common factors (Kaminsky and Reinhart, 1999). The Philippines was the least affected by the crisis with only four distressed financial firms, two of which are banks and the other two nonbank financial institutions which were eventually closed (Bongini, Claessens and Ferri, 2000). A unique post-crisis response of the Bangko Sentral ng Pilipinas (BSP) was the encouragement of mergers and consolidation in the sector (Gochoco-Bautista, 1999). Banks merged as they tried to reap economies of scale advantages and positioned themselves against a more intense threat of domestic competition and across borders. Milo (2000) reported seven mergers from 1998-2000 while Manlagñit and Lamberte (2004) accounted fourteen mergers from 1998-2003. The four-firm concentration (C4) ratio in 1992-1994 averaged 47.32% and 52.10% for loans and deposits, respectively. These dropped to 40.46% and 46.42% for loans and deposits, respectively, following liberalization in 1995-1997. For the period 1998-2004, the average C4 ratio for loans and deposits were 46.2% and 49.6%, respectively. Hence, the C4 ratio reverted back to their pre-liberalization levels following consolidation in the industry after the Asian financial crisis. The next section of the paper discusses the empirical model and method, followed by data and then results. The last section concludes.

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EMPIRICAL MODEL AND METHOD

Empirical Model

According to Greene (1980), the translog function is the most frequently selected model to measure bank efficiency because it is a flexible functional form. The absence of a priori restrictions on substitution possibilities among the factors of production allows both economies and diseconomies of scale at different output levels. The translog cost frontier of the banks is given by Equation 1.

$$\ln C_{it} = \beta_0 + \sum_{j=1}^{2} \beta_1 \ln w_{jit} + \frac{1}{2}\sum_{j=1}^{2}\sum_{k=1}^{2} \beta_2 \ln w_{jit} \ln w_{kit} + \sum_{l=1}^{3} \beta_3 \ln y_{lit} + \frac{1}{2}\sum_{l=1}^{3}\sum_{m=1}^{3} \beta_4 \ln y_{lit} \ln y_{mit}$$
$$+ \sum_{n=1}^{2} \beta_5 \ln z_{nit} + \frac{1}{2}\sum_{n=1}^{2}\sum_{p=1}^{2} \beta_6 \ln z_{nit} \ln z_{pit} + \sum_{j=1}^{2}\sum_{l=1}^{3} \beta_7 \ln w_{jit} \ln y_{lit}$$
$$+ \frac{1}{2}\sum_{j=1}^{2}\sum_{p=1}^{2} \beta_8 \ln w_{jit} \ln z_{nit} + \sum_{l=1}^{3}\sum_{p=1}^{2} \beta_9 \ln y_{lit} \ln z_{nit} + \ln u_c + \ln \varepsilon_c \quad \text{[Equation 1]}$$

where *ln* C_{it} is the natural logarithm of the total cost; *ln* w is the natural logarithm of the j^{th} input price given $j<k$; *ln y* is the natural logarithm of the l^{th} output given $l<m$; *ln z* is the natural logarithm of the n^{th} netput with the restriction that $n<p$ (the subscript *o* is skipped so as to be not confused with the subscript of the intercept). The second and third subscripts of the variables *i* and *t* pertain to bank number and time of the observation, respectively. βs are the coefficients to be estimated. The term *ln* u_c is non-negative random variable associated with inefficiency of input used, given the levels of outputs and the quasi-fixed inputs. The *ln* u_c implies that the observed cost for the given level of outputs and quasi-fixed inputs are not as small as would be possible if the banks were fully efficient in their use of input. *ln* ε_c is a random variable associated with measurement errors in the input variable or the effect of unspecified explanatory variables in the model. For the profit function, the alternative over the standard profit concept is employed due to imperfect competition in the market following Berger and Mester (1997). The profit function uses essentially the same specification with few changes. First, the dependent variable for the cost function replaces *ln C* with *ln* $(\pi+\theta)$, where π is the bank's profit for a particular year. Since minimum profit can be negative, the absolute value of the minimum profit in the sample plus 1 equals θ is added to every firm's dependent variable in the profit function so that the natural log is taken of a nonnegative number. Thus, for the bank with the lowest profit value for the year, the dependent variable will be *ln* (1) = 0. Second, all other terms and variables are the same except the terms *ln* u_c and *ln* ε_c which are relabeled to *ln* u_π and *ln* ε_π, respectively. Scale economies can be calculated from Equation 1. Banking scale economies are measured by the reciprocal of the elasticity of cost with respect to output. Increasing, constant and decreasing returns to scale or economies of scale are present if the estimates are greater than, equal and less than 1, respectively.

Method

The study employs the parametric translog stochastic frontier approach to estimate the cost and profit functions. The translog functional form, due originally to Christensen, Jorgenson and Lau (1971), has several advantages: 1) it accommodates multiple outputs without necessarily violating curvature conditions; 2) it is flexible, providing a second-order approximation to any well-behaved underlying cost frontier at the mean of the data; and, 3) it forms the basis of much of the empirical estimation and decomposition of cost efficiency based on a system of equations. The translog form of the cost and profit functions adopted in this study is consistent with the concept of economic optimization. Furthermore, since the parametric techniques correspond to the cost and profit efficiency and economic optimization concepts, the stochastic frontier approach (SFA) is adopted. In using the SFA, the inefficiency and random error components of the composite error term are disentangled by making explicit assumptions about their distributions. The random error, *ln* ε, is assumed to be two-sided, normally distributed, and the inefficiency term, *ln u*, is assumed to be one-sided, half normally distributed. The parameters of the two distributions are estimated and can be used to obtain estimates of bank-specific efficiency. Coelli's (1996) Frontier Version 4.1 is used to estimate the cost and profit efficiency of the banks. The software estimates the cost and profit models using maximum likelihood estimation technique. In the second stage, regressions are employed to test potential correlates of the profit and cost efficiency scores.

DATA

Variable Definition

It is commonly acknowledged that the choice of variables in efficiency studies significantly affects the results. A number of studies present results that differ due to variable selection (Favero and Pappi, 1995; Hunter and Timme, 1995). This seems to be unlikely for this study as it deals only with the Philippines' financial statements reportorial regime. The variable selection for this study relied mainly on classical banking theory. For the dependent variables, cost is defined as operating plus interest costs, includes interest paid on deposits, labor cost and cost of purchased funds. Profit is defined as revenues from loans, securities and services, less variable costs, before tax. For the bank outputs, following the intermediary approach, the cost function for Philippine banks is shaped using three outputs: loans, other earning assets and services, all expressed in constant 2000 prices. Only three outputs are included in the model to provide parsimonious estimation of the parameters and to promote tractability. The loans variable includes all forms of retail and commercial loans to customers. Other earning assets include securities and equity investments of the banks in allied and non-allied undertakings. The services variable is constructed as the total value of services income, which comprises of fee-based income, net revenues from security and currency trading, and income from off-balance sheet transactions. The three outputs are expected to have positive signs for the cost and profit functions. The prices of labor and deposits are the two input variables considered in the profit and cost functions. Price of labor is calculated as total personnel cost including fringe benefits divided by total assets. Price of deposits is computed by dividing the total interest expenses by the total amount on deposits and purchased funds. It is expected that input prices are positively linked with cost and profit. For the fixed netput quantities, the treatment of physical capital as quasi-fixed input is relatively standard in efficiency estimation but financial equity capital is not. Physical capital includes bank's investment in home and branch offices, equipment, furniture and fixture, which generally show little variability in the short run (Hunter and Timme, 1995). Physical capital is measured by the number of bank branches that proxies for service quality as well. Financial equity capital includes shareholders' equity and accounts for the different risk preferences on the part of banks (financial capital availability to absorb portfolio losses) as well as the portfolio risk (raising equity typically involves higher costs than raising deposits) following Berger and Mester (1997). In the second stage, cost and profit efficiency scores are regressed with the log of total assets as a proxy for size effects; equity ratio or the degree of leverage of the bank; net interest margin or the contribution of interest income to operating income; return on average assets (ROAA) and equity (ROAE), the traditional accounting measures of performance; dummy variables for foreign-ownership and expanded commercial banking status.

Sample Selection and Dataset Construction

The dataset is constructed from the Bankscope Fitch IBCA database, an internationally recognized source of information for financial institutions. The data are from two compact discs, one for the 1992-1998 period and the other for the 1999-2004 period, containing bank financial statements and other company information. After weeding out non-commercial banks, the number of banks is reduced to 39. Eight banks are with complete data for the entire 13-year period. The dataset is an unbalanced panel of 306 observations. The variables are deflated using the Consumer Price Index (CPI). The sample accounts for an average of 82.4%, 59.1% and 90.3% of the total assets, loan and deposit portfolio of the entire commercial banking sector from 1992 to 2004. The industry-level variables were sourced from the BSP, Philippine Deposit Insurance Commission and the National Statistical Coordination Board. The descriptive statistics is given in Table 1.

Table 1 Descriptive statistics of variables used in translog profit and cost frontiers*

	Mean	Maximum	Minimum	Standard deviation
Profit (P)	30,267.77	318,966.96	-325,520.80	56,814.58
Cost (C)	186,866.62	1,010,331.50	4,760.11	209,165.86
Loans (y_1)	1,165,191.00	6,727,454.90	11,532.51	1,297,196.15
Other earning assets (y_2)	695,046.39	4,050,133.10	13,907.34	794,448.67
Services (y_3)	45,701.24	390,794.20	150.42	54,454.94
Price of labor (w_1)	0.001428	0.05	0.00	0.00049
Price of funds (w_2)	0.006298	0.18	0.01	0.00248
Total fixed assets (z_1)	268,051.28	1,499,517.20	12,246.27	287,322.19
Number of branches (z_2)	135.55	595.00	1.00	128.75

* in constant US dollars, with base year 2000.

RESULTS AND DISCUSSION

The translog profit and cost functions are estimated with three outputs, two input prices, and two quasi-fixed netputs as first order terms, and their mixed products and the square of the inputs, outputs and netputs representing second order terms of the flexible form. The results of the maximum likelihood estimation (MLE) are presented in Table 2. Out of the 34 regressors, the profit and cost estimates report 7 and 22 regressors as statistically significant, respectively. Five variables are significant for both estimates. Among the outputs, other earning assets (securities and equity investments) and services are significant for the cost function while only loans is significant and positive for the profit function. Services are found to be cost-absorbing with a coefficient of 1.67 (β_3) while other earning assets are not (negative coefficient of β_2 at -0.99). This result is not surprising considering that fee- and commission-based services, including other off-balance sheet transactions have high associated costs in terms of personnel expenses, branch network and physical capital. Moreover, services income account for as much as 36% on average of the sources of operating income for the 306 observations. Sharp reduction of banks' main profit source (interest income) has been forcing them to find new income alternatives to deal in, implying a larger impact on the cost function. Therefore, it seems plausible to expect a higher cost connected to the production of services as it requires high investments in financial and payment system technology such as software, telecommunications and human capital. Other earning assets (β_2=-0.99) are cost-transferring because they are less dependent on the bank's physical capital and ride-on the joint production of bank services. Loans (β_1=6.06) still imply a high and significant contribution to the firm's profit. The specific output returns to scale of other earning assets and services yield constant returns to scale [$(\varepsilon=|-0.99|^{-1}=1$] and decreasing returns for services [$\varepsilon=1.67^{-1}=0.60$], respectively. This means that if inputs are doubled, the output other earning assets is also doubled but the output services is only increases by 60%. This can be explained by the fact that other earning assets or the securities and investments output of a bank rides-on with the usual banking operations.

The negative but significant elasticities of the price of labor (w_1) and price of funds (w_2) seem to suggest the non-positive influence of the wage and deposit rates to the bank's cost function. This is surprising considering that input prices are expected to significantly and positively influence operating cost. In an efficiency study involving seven countries, Kwan (2003) found that the Philippines' labor cost to total operating cost is highly statistically significant and has a negative sign. Kwan (2003) interprets the negative coefficient of labor price as evidence that Philippine banks use relatively more labor because it is cheap. From the database used in the study, the unit price of labor, defined as the personnel and fringe benefit expenses of the banks divided by the number of employees, has been steadily declining from as high as US$ 13,813 in 1995 to US$7,000 in 2004 in real terms. The price of funds likewise non-positively influences cost as it is often below the registered inflation rate. The elasticity of the price of labor (β_4=-3.36) is smaller than the elasticity of the price of funds (β_5=-0.95). This suggests that banks can control more personnel expenses than interest expenses when prices arise. A likely explanation is that, at least, in the short run, it seems more difficult to cut interest expenses than personnel expenses as the former is partly determined by the market and an already low interest rate (at times negative real interest rate) on deposits (cheap funds) is difficult to reduce further. The notion that banks tend to control personnel expenses more than interest expenses when prices increase is also consistent with the ongoing tendency among banks to restructure through mergers and acquisitions that results in the reduction of the number of personnel.

The quasi-fixed netput equity capital (z_1) is inversely related to both the cost and profit dependent variables at 1% and 5%, respectively. Capital used for prudential concerns reduces cost in the long run but the opportunity cost associated with the high cost of capital reduces profits. Two mixed product terms involving equity capital are also found to be significant for both profit and cost functions. The interaction term of loans and equity capital (β_{23}) is significant and positively related to both profit and cost. Bank capital directly affects costs by providing an alternative to deposits as a source of funding for loans. A likely explanation for the positive influence of the interaction term on profits is that interest paid on debt counts as a cost while dividends paid are not. On the other hand, the slightly significant but nevertheless positive effect of the interaction term on cost can be partly explained by the fact that raising equity involves higher costs than raising deposits, hence costs will be higher for banks using a higher proportion of equity financing. The interaction term wage rate and equity capital (β_{26}) is positive and highly significant for both cost and profit functions. The intensity of risk management activities by banks as represented by the magnitude of equity capital deployed for insolvency risk management as well as the salaries of risk management professionals may increase cost. The long-run effect of these risk management activities that reduce portfolio losses may increase profits.

Table 2 Maximum likelihood estimation for the profit and cost functions

Regressors†		Profit		Cost	
Betas	Notation	Coefficient	t-ratio‡	Coefficient	t-ratio‡
β_0	Constant	29.65	1.51	10.33	3.18***
β_1	(y_1)	6.06	1.65*	0.45	0.85
β_2	(y_2)	2.08	0.74	-0.99	-2.31**
β_3	(y_3)	1.40	0.46	1.67	3.83***
β_4	(w_1)	-2.31	-0.54	-3.36	-5.23***
β_5	(w_2)	0.91	0.26	-0.95	-1.97**
β_6	(z_1)	-12.86	-3.86***	-1.01	-2.12**
β_7	(z_2)	0.06	0.06	0.48	2.50**
β_8	$(y_1)(y_1)$	-0.10	-0.57	0.07	2.96***
β_9	$(y_2)(y_2)$	0.12	0.67	0.15	5.84***
β_{10}	$(y_3)(y_3)$	0.11	0.83	0.06	3.42***
β_{11}	$(w_1)(w_1)$	0.17	0.45	0.26	4.74***
β_{12}	$(w_2)(w_2)$	0.02	0.10	0.04	1.25
β_{13}	$(y_1)(y_2)$	-0.68	-2.21**	-0.27	-5.98***
β_{14}	$(y_1)(y_3)$	0.01	0.03	0.03	0.73
β_{15}	$(y_2)(y_3)$	-0.13	-0.61	-0.71	-2.23**
β_{16}	$(w_1)(w_2)$	-0.12	-0.28	0.07	1.23
β_{17}	$(y_1)(w_1)$	-0.81	-2.01**	0.08	1.34
β_{18}	$(y_2)(w_1)$	-0.01	-0.03	-0.02	-0.37
β_{19}	$(y_3)(w_1)$	-0.13	-0.35	-0.18	-3.46***
β_{20}	$(y_1)(w_2)$	-0.47	-1.59	0.03	0.73
β_{21}	$(y_2)(w_2)$	-0.15	-0.47	0.21	4.76***
β_{22}	$(y_3)(w_2)$	0.10	0.39	-0.17	-5.04***
β_{23}	$(y_1)(z_1)$	0.74	2.05**	0.08	1.67*
β_{24}	$(y_2)(z_1)$	0.47	1.53	0.09	1.93**
β_{25}	$(y_3)(z_1)$	-0.19	-0.65	-0.09	-2.33**
β_{26}	$(w_1)(z_1)$	1.20	2.77***	0.29	4.66***
β_{27}	$(w_2)(z_1)$	0.52	1.37	-0.04	-0.71
β_{28}	$(z_1)(z_1)$	-0.24	-0.90	-0.04	-1.14
β_{29}	$(y_1)(z_2)$	0.03	0.16	0.01	0.43
β_{30}	$(y_2)(z_2)$	0.02	0.17	-0.05	-2.53**
β_{31}	$(y_3)(z_2)$	0.00	0.03	-0.01	-0.43
β_{32}	$(w_1)(z_2)$	-0.07	-0.34	-0.11	-3.64***
β_{33}	$(w_2)(z_2)$	-0.01	-0.04	0.02	0.78
β_{34}	$(z_2)(z_2)$	-0.10	-2.19	0.06	8.60***
sigma squared		0.49	7.48	0.03	3.79
gamma		0.10	0.82	0.72	9.41
eta		-0.06	-0.82	0.00	0.03
log likelihood function			-313.42		286.36
LR test of one-sided error			0.92		56.06

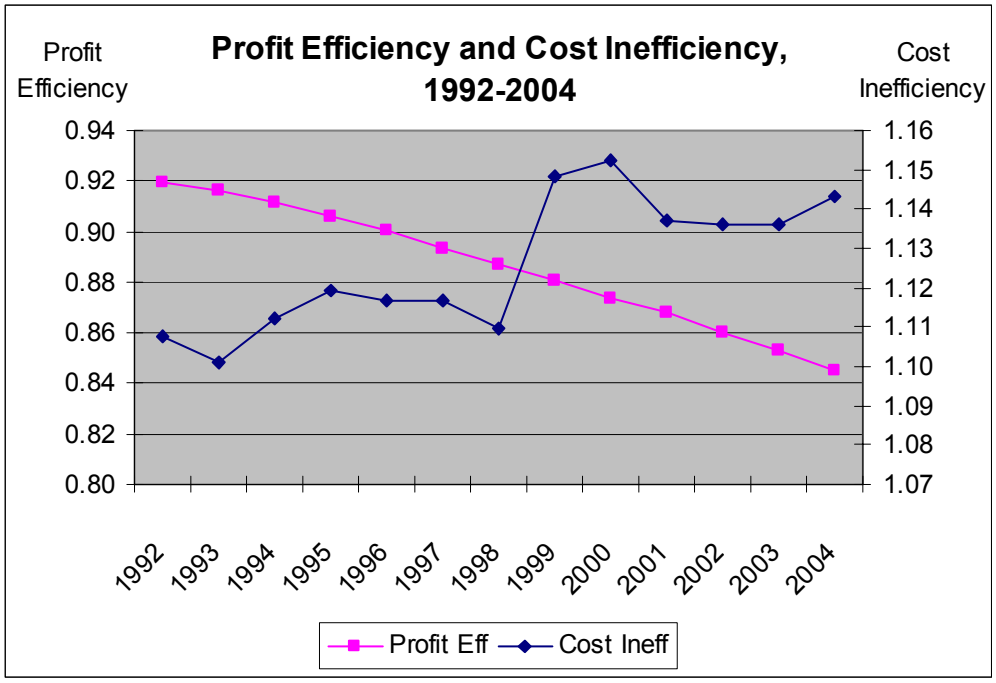
†Variable notation: Loans (y_1); Other earning assets (y_2); Services (y_3); Wage rate (w_1); Cost of funds (w_2); Financial equity capital (z_1); and, Number of branches (z_2); ‡ t-ratio superscripts ***, **, * denote significance at 1%, 5% and 10%, respectively.

The other netput is bank branches and its quasi-fixed nature follows from the significant adjustment costs and time required to dismantle or significantly alter branching networks. The variable is significant and positively impacts the bank's cost (β_7=0.48). Its square term (β_{34}) is highly statistically significant, positively and negatively influencing the cost and profit functions, respectively. This finding suggests that the collective products and services offered by banks require a wide network of bank branches which may cause a rise in total cost thereby depressing profits. The product of the two outputs, loans and other earning assets (β_{13}) is likewise significant for both profit and cost estimates. The negative sign suggests substitutability rather than complementarity between the two bank outputs. This is because the source of funds of the two outputs (assets side) is basically the bank's deposit

base (liabilities side). Separately, the variable loans (β_1=6.06) is found to positively influence profit levels while the variable other earning assets (β_2=-0.99) is found to be negatively related to cost, suggesting that securities and equity investment in allied and non-allied undertakings do not exert much pressure on the banks' cost structure. Another product of two outputs, other earning assets and services has a negative sign (β_{15}=-0.07) suggesting substitutability between the two as engagement in securities and equity investments reduces resources needed in other non-banking and non-security and investment-related services.

The annual profit and cost efficiency scores for the dataset are illustrated in Figure 1. For the unbalanced panel data, average profit efficiency of 88.52% and average cost inefficiency of 12.60%, with a standard deviation of 4.6% and 7.89%, respectively, are reported for the period 1992 to 2004. The trend for profit efficiency is that it is steadily declining—from a high of 92% in 1992 to a decrease to 84% in 2004. The trend for cost inefficiency points to a structural break—10% to 12% inefficiency in 1992 to 1998, and then a jump to 14 to 15% in 1999 to 2004, a most likely after-effect of the Asian financial crisis. Eta (η) for both profit and cost estimates are not significant at any level, indicating the absence of cross-section (bank-level) time-varying efficiencies.

Figure 1.



In terms of goodness-of-fit of the model, the log likelihood functions of the profit and cost estimates are reported at –313.42 and 286.36, respectively. Evaluated using the chi-square statistic at 32 degrees of freedom and at 1% level of significance, there is no reason to reject the null hypothesis that the parameters are not significantly different from other fixed values. The log likelihood ratio (λ) of 0.92 and 56.06 for the profit and cost functions, respectively, seems to point that a reduced model provides the same fit as a full model for the cost function (significant at 1% level) but not for the profit model. This is because for the profit model, only two variables are significant among the seven first- order regressors while for the cost model, only one is not significant. Sigma squared or the square of the error terms (σ^2), significant at p<0.01 level for both profit and cost functions, indicates highly significant profit efficiency and cost inefficiency parameter estimates. The t-ratio of the gamma (γ) for the profit function is not significant while that of the cost function is significant indicating that sigma squared term is zero (close to zero in fact at 0.03) hence the model can be estimated using OLS. Mu (μ) is restricted to zero since the model assumes half-normal distribution.

For mergers and acquisitions, the BSP reports 20 mergers from 1992-2004. The acquired banks, in most cases, have higher profit and cost efficiency scores than the surviving or acquiring banks. Vela and Paradi (2002), however, recommends that to test for synergy gains, the efficiency of both acquiring and acquired banks should be

weighted based on total assets before the merger and compared with the efficiency scores after the merger. The formula of Vela and Paradi (2002) is applied for the merged banks in the sample. Results indicate no significant synergy gains of the mergers based on the comparison the weighted efficiency scores at least three years before the merger whenever data permits, and the efficiency scores three or more years after the merger date. The weighted efficiency scores before and after the merger for both profit and cost functions for eight mergers allowed by the sample show that the changes were 1% or less in magnitude. Empirical evidence on the efficiency gains of mergers has been mixed (Rhoades, 1993; Shaffer, 1993; Peristiani, 1997; Fixler and Zieschang, 1993).

Potential correlates of profit and cost efficiency are also examined. In Table 3, profit efficiency is found to increase with asset size up to 170 billion pesos, then drops precipitously to 84.7% in the asset size range of 170 to 400 billion pesos. The megabanks, those with asset sizes of 400 billion pesos and above have relatively high profit efficiency level of 89.75%. Cost inefficiency registers at 12.34% for banks with asset sizes below the 50 billion peso mark, hits bottom at 11.28% for those in the 50 to 100 billion peso range, then inefficiency increases for the 400 billion peso asset size range. The cost inefficiency scores across the first four categories exhibit a U-shaped curve. The asset size category of 400 billion pesos and below have the lowest cost inefficiency score of 9.66%. Overall, total assets of the banks as a proxy for size is negatively correlated with profit efficiency as shown in Table 4.

Table 3 Average profit efficiency and cost inefficiency per asset size category

Asset size*	Average size*	No. of Observations	Profit efficiency (%)	Cost inefficiency (%)
< 50	22.35	156	88.75	12.34
50 to <100	71.58	52	89.34	11.28
100 to <170	132.10	42	90.68	12.33
170 to <400	257.88	47	84.68	15.76
400 and above	453.41	9	89.75	9.66

*in constant 2000 Philippine billion pesos.

Regressing the potential correlates of efficiency scores is due to Berger and Mester (1997) and the results for this study are shown in Table 4. Equity ratio, consistent with the netput variable equity capital, is significant for both functions. The traditional measures of profitability (ROA, ROE, Net interest margin) are well-correlated with the profit function. The expanded commercial banking (universal bank status) dummy is found to be significant and positively related to profit efficiency suggesting scope economies while the foreign-bank ownership dummy is positively correlated with cost inefficiency. The reason for this is that foreign banks incur higher personnel and operations expenditure. Another reason why foreign banks performed badly in the Philippines is that they are really small fractions of their parent entities which operate globally. Foreign banks in the Philippines are mostly branch offices of the parent bank, and not subsidiaries. This finding is similar to the case of India wherein foreign banks fared poorly compared to domestic banks (Sensarama, 2006).

Table 4 Regression of potential correlates with profit efficiency and cost inefficiency scores

	Profit Efficiency	Cost Inefficiency
Constant	1.0395 (19.5316)***	1.0763 (10.6824)***
Equity Ratio	-0.0009 (-2.1657)**	-0.0025 (-3.2004)***
ln Total Assets	-0.0137 (-3.6233)***	0.0043 (0.5934)
Net Interest Margin	0.0092 (5.2059)***	0.0069 (2.0756)**
Return on Average Assets	-0.0122 (-3.4534)***	-0.0020 (-0.2979)
Return on Average Equity	0.0021 (5.5697)***	-0.0011 (-1.4998)
Foreign-owned=1; 0 otherwise	-0.0099 (-1.1394)	0.0509 (3.0887)***
Universal bank=1; 0 otherwise	0.0132 (1.7367)*	0.0077 (0.0535)
R-squared	0.284879	0.126042
Adjusted R-squared	0.268024	0.105444

t-statistics in parentheses; ***, **, * denote significance at 1%, 5% and 10%, respectively.

CONCLUSION

The effects of liberalization, Asian financial crisis and mergers on banking industry efficiency can be examined in relation to regulatory and policy reform. In terms of liberalization, with 18 foreign against 25 local banks as of 2005, foreign banks continue to exert pressure on the domestic banks by forcing the latter to narrow the interest rate spread (Unite and Sullivan, 2003), but in terms of concentration ratios, these dropped after the liberalization but have since recovered and even exceeded their pre-liberalization levels due to consolidation in the industry after the Asian financial crisis. The statutory limit of six branches for foreign bank does not fully make the sector competitive. Meanwhile, the cost inefficiency of the sector increased in the aftermath of the crisis as shown in the average annual data from the translog cost estimates. Mergers and the consolidation of the banking sector altered the rankings and market share of the players, but the data on profit and cost efficiency show that the weighted scores of the acquired and surviving banks before the merger have not improved three years after the merger. Synergy gains from the merger might need a longer time to be realized. As Williams and Nguyen (2005) noted, the benefits associated with domestic M&As are realized in terms of technical developments, which determine productivity rather than managerial performance (efficiency). It is recommended that the playing field for foreign and domestic banks be leveled to unleash the efficiency effects of competition. The policy of merger and consolidation should likewise be continued even without central bank incentives to ensure the creation of viable and efficient commercial banks that fully exploit scale and scope economies.

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