V. EMPIRICAL RESULT

Table IV reports estimation results of the equation (1). The model (1), which estimates only the bank characteristic, and the model (2), which considers both bank characteristics and macroeconomic factors, are not enough to explain the profitability of banks. The models (3) and (4) add the financial structure factors by considering the development of Thai stock market and role of stock market as complementary or substitute for banks as source of fund of business.

For specification of the model, the model (3) uses MACPASS as the proxy of the development of Thai stock market comparing with bank assets, while the model (4) uses the MACGDP and ASSGDP as the proxy of the development of Thai stock market and banks comparing with GDP, respectively. However, we found that MACGDP and ASSGDP have a high correlation (-0.796) which may cause the multicollinearity problem in model (4). Therefore, we use the model (3) as the main equation to explain the determinants of profitability of banks. Estimation results of the fixed effect models are shown in Table IV.

[Table IV is here]

In order to improve the model (3), we estimate the model (3) with random effect and compare the result with fixed effect by Hausman test. Table V shows the fixed effect and random effect estimation and specification tests.

[Table V is here]

The result from Hausman test indicates that fixed effect is more appropriate to explain the profitability equation than random effect with the Chi-square (d.f. = 8) of 29.27 (prob. = 0.0003). Thus, the results confirm that the model (3) fixed effect model is appropriate to explain determinants of Thai commercial banks' profitability.

All bank characteristic variables except LNSIZE are significant in line with the expectation. Finding that the coefficient of LNSIZE is insignificantly positive reflects that the size does not have a significant impact to ROA.

The proxy of the strength of bank, which reflects the level of capital as the cushion against risk, positively correlates to the ROA with a coefficient of 13.757 in model (3). If other

variables are equal, the increase of one unit of EA will increase ROA by 13.757 percent. This result is in line with our expectation, confirming the assumption that the strength of capital may increase ROA. In customers' view, well-capitalized banks have low expected bankruptcy costs, and thus their cost of funding is low.

Loan loss provision to loans ratio (PL) is the proxy of credit risk that significantly negative correlates to profitability with coefficient of -0.044 in model (3). If other variables are equal, the increase of one percent of PL will decrease ROA by 0.044 percent. If other factors are set to be equal, it will increase the profitability from increasing interest income when the banks expand business loans. However, the banks may lend to the firms that have high risk of the repayment problem, which ultimately leads to become non-performing loans (NPLs). Thus, banks have to set the loan loss provision as expenditure for cushion the risk. This indicates that banks should set the proportion of loan loss provision and loans for the benefit to ROA.

Operating cost to assets ratio (COSASS), the proxy of operating management, has a significantly negative sign with coefficient of -1.534. If other variables are equal, the increase of one percent of COSASS will decrease ROA by 1.534 percent. This finding is similar to most studies which found that the higher cost reduces the ROA for banks of the developing countries. However, in some study, it was found that the positive sign in case of the investment can generate more income such as investment in IT system.

For macroeconomic conditions, the GDP has a significantly positive impact to ROA in all models. The coefficient of 0.084 indicates that the economic growth has a positive influence to the bank profitability. If other variables are equal, the increase of one percent of GDP will increase ROA by 0.084 percent. For Thai economy that is bank-based, GDP growth should positively correlate to bank profitability due to the linkage between economic growth and business units that need bank loans for expanding the business. However, there is no significant impact of the inflation (INF) for all models.

Regarding financial structure, MACGDP (-0.346) and ASSGDP (-0.876) in model (4) are significantly negative related to the ROA, indicating that the development of stock market and banking sectors decreases bank profitability due to an increasing competition in banking sector.

These results are consistent with the negative sign of MACPASS (-0.281) in model (3). However, MACPASS is insignificant, reflecting that there is no significant impact of the substitution between debt finance and equity finance.

Overall, these variables from models (3) and (4) indicate that the development of stock market comparing to banks is a disadvantage of banks in term of profitability. This reflects that a larger stock market relative to the banking sector may lower bank margins and profitability due to the substitution possibilities between debt and equity financing. Nonetheless, the development of stock market is the good for the economic system as it may be an alternative funding of firms. On the other hand, the stock market is also the substitution of bank lending. It plays the role as competitors for banks in lending business, which is the core business. Thus, it should have negative effects to ROA of banks. However, it may play the complementary role to bank business in supporting other scopes of banks. For example, in the issuing stocks of firms, banks can get the fees from being underwriting to the stock issuing. In addition, stock market can support treasury business that should directly relate with profitability of banks.

For the concentration, HHI in models (3) and (4) has a positive sign in both models, albeit insignificant, indicating that there is no significant impact of concentration to bank profitability. The concentration of the Thai banking system measured with HHI indicates that the Thai banking system competes with quite high concentration with the average of HHI over the year 1997-2007 of Thai commercial banks of about 0.1327. However, we found that the concentration has no significant impact to the profitability of Thai banks.

In order to analyze the influence of ownership to the profitability of banks, we divided the Thai commercial banks into two groups: the private-ownership banks and the government-ownership banks. Table VI shows the effect of ownership to the ROA.

[Table VI is here]

For the private-ownership banks, all the variables, with an exception of MACPASS, have the similar signs among all banks. However, the equation of the government-ownership banks has no fixed effect (cross section F statistic 0.911 and prob. F 0.405) and there are only EA, PL, and GDP that have low level of significance. The reason why government-ownership equation is not

significant for the joint test and many variables are not significant may come from the small samples and the intervention from Financial Institutions Development Fund (FIDF).

Interestingly, the coefficient MACPASS of the private-ownership banks is significantly positive, while it is insignificantly negative in case of all banks and government-ownership banks (Table VI). It reflects that the management of private-ownership banks outperforms the government-ownership banks in the same economic conditions. In other words, the increasing role of stock market relative to banks is beneficial for the private-ownership banks as complementary product, but it is disadvantage to the government-ownership banks as the substitution of lending.

VI. Conclusion

This study focuses on the determinants of profitability of Thai banks over period 1997-2007. We use the fixed effect and random effect and compare the results by Hausman test. The result suggests that the fixed effect of model (3) is appropriate to explain the profitability equation. The estimation result of model indicates that bank profitability proxied with ROA is determined by the relationship of macroeconomic factors, financial market structure, and bank's characteristic and profitability.

For bank characteristic variables, four determinants explaining the bank profitability are size, capital, credit risk, and cost. First, bank size has an insignificantly positive effect to ROA, indicating that there is no significant impact of size to bank profitability. Second, the strength of bank as proxied by equity to asset ratio is positively related to the ROA because banks with strong capital have low expected bankruptcy costs leading to lower cost of funding. Third, credit risk proxied by loan loss provision to loans ratio has significantly negative impact to profitability for all banks and both private and government-owned banks. This reflects that banks should expand loan growth prudentially by concerning the ability to repay of customers in order to avoidance of NPLs, which are the burden of setting a large number of loan loss provisions to absorb credit risk. Finally, we found the negative impact of operating cost to profitability,

reflecting that the operating management efficiency of Thai commercial banks is low and does not enhance the bank profitability.

For macroeconomic variables, we found that GDP positively affects profitability of Thai commercial banks because the economic growth is associated with the expansion of business and the demand for loan. This relationship is associated with the bank-based economy. Thus, loan quality in the period of high economic growth tends to be good debt. However, we did not find that the inflation has significant effects for profitability.

For the financial structures, the importance of stock markets and banks measured with stock market capitalization to bank assets ratio has an insignificantly negative impact to profitability of all banks. This indicates that there is no significant impact of the substitution effect between debt and equity financing. Finally, the concentration proxied by HHI is positive for private-ownership banks but negative for government-ownership banks. However, this effect is insignificant in all groups. It seems that the private-ownership banks have better management under the same macroeconomic conditions and financial structures compared to the government-ownership banks.

The results from this study can be applied for the commercial bank to improve profitability. First, the banks should understand the determinants and their effects to profitability and make the policies appropriately. Second, banks have to concern the credit risk prudentially and set the suitable level of loan loss provision when expanding the loan growth. Third, banks should improve operating management that can generate benefit to the bank. Finally, the central bank and government should understand the effects of macroeconomic variables and financial structures to the profitability of the banks.

In the near future, the commercial banks tend to be universal banking and face the tough competition from foreign banks and non-banks owing to the change of financial landscape. Thus, there are several areas of study in order to improve the profitability and efficiency of Thai banking system under changes of macroeconomic conditions, regulations, and financial market structure, which will ultimately lead to an improvement of the profitability, efficiency and stability of Thai banking system.