
DETERMINANTS OF BANK PROFITABILITY AND RISK-TAKING IN CHINA

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PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN FINANCE

In the Master of Science in Finance Program

of the

Faculty

of

Business Administration

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SIMON FRASER UNIVERSITY

Fall 2017

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Abstract

By using the ordinary least squares estimation technique, this paper examines the relationship between bank-specific characteristics together with macroeconomic factors, and profitability in Chinese banking sector. Therefore, to find out the how each factor affects the bank's profitability. Moreover, this paper also uses three risk measures to analyze the banks' business condition. The regression analysis is based on a panel data set consisting of 152 observations of 30 Chinese banks over a 6-year period from 2011 to 2016. We found that for profitability, capital ratio and GDP growth rate have significant positive impacts and inflation rate has significant negative impact. Other independent variables do not have significant relationship with bank's profitability. For risk, none of the independent variable has significant impact on Z-score and non-performing ratio; however, total deposits to total assets ratio and bank size have significant impact on non-interest income ratio.

Keywords: Bank Profitability; Chinese Bank; Risk

Acknowledgements

We want to express our sincere appreciation to Dr. Christina Atanasova for helping and supporting us to complete this final project. Her enthusiasm, knowledgeability, and patience truly inspired us to complete the research and report. We also want to thank Dr. Victor Song for being our second reader and taking time to finalize our project.

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1. Introduction

The banking sector has always been one of the most important sectors in our economy. They are considered as the life-blood in business activities. Although banks do not create wealth, their operation facilitates the process of production, exchange, and distribution of wealth. Without banking system, it's impossible to collect deposits and provide credits to individual and institutions. As a result, all the business activities won't be able to continue.

In China, banks play a vital role for ordinary citizens to deposit their savings and business to get loans. The Chinese banking system puts emphasis on traditional financial intermediate between borrowers and savers domestically. (Grant Turner, Nicholas Tan, and Dena Sadeghian) According to China Banking Regulatory Commission, there were 3747 financial institutions in the banking industry in China as of 2012. It totals asset of 134 trillion RMB, which is 21.6 trillion USD, and increased 18 percent from the previous year. Before the Chinese economic reform, there was only one bank in China, which was the People's Bank of China (PBC). It was part of the Ministry of Finance, and its major function was collecting revenues from state-owned companies and allocating investment funds. (Jiliang 2004; Pei and Shirai 2004, Walter and Howie 2011). For the past few decades, especially during the 1990s and 2000s, many significant changes were made in China's banking system, which dramatically reshaped the Chinese banking sector. As part of economic reform, the commercial banking functions of the People's Bank of China were split off into four independent but state-owned banks. People's Bank of China currently is the central bank of

China with the power to carry out monetary policy and regulate financial institutions.

Because of the transition in China's economy, there are many difference between Chinese banking system and the western. After the economic reforms, China's banking system is function more like the one in the western world than before. Many banks have gained more autonomy. However, government still have a lot of control in the banks, especially the Big Four, which include Bank of China, Industrial and Commercial Bank of China, China Construction Bank, and Agricultural Bank of China. Due to the interruption from the central government, Chinese banks have large amounts of non-performing loans. According to a report from People's Bank of China, non-performing loans account for 21.4% to 26.1% of total lending in the Big Four in 2002. During the planned economy era, banks followed the central government' plan. They had never developed any strategy and market orientation. Therefore, banks lacked market orientation capability and development ideas. During the transformation from planned economy to market economy, circumstances like national policies, local government's behavior, and social credit environment had bad impact on Chinese Banks, and the banks committed great cost for economic structure adjustment, social development, and economic mechanism reform. Many enterprises thus take the advantage of the transformation to get rid of their bank debts, such as through spinning off, bankruptcy, and merging.

During the past decade, risk management in banking industry has been transformed. Because of the global financial crisis, many countries came up with new regulations to respond. According to McKinsey's *The Future of Bank Risk Management*, about 50 percent of the function's staff are doing risk-related work such as credit administration.

The Chinese banking sector has been growing rapidly accompany with the boom of Chinese economy, especially the state-owned banks. A large portion (80%) of financing of the Chinese economy comes from these state-owned banks, and 10% of these financing turned out to be bad debt. China Banking Regulatory Commission (CBRC) has been launching rules and regulations to mitigate the risk exposure.

In this paper, a sample of 30 Chinese banks over the period from 2011 to 2016 is used for both profitability and risk-taking model. The profitability model seeks to examine that how internal and external factors impact bank's profitability. For this model, we have both ROA and ROE as our dependent variable. For risk-taking model, we use natural logarithm of Z-score, non-performing ratio, and non-interest ratio to examine how significantly the internal and external factors affect the banks' risk. The empirical results suggest that capital ratio and GDP growth rate have significant positive relationships with ROA, while inflation rate is negatively related with ROA, and other independent variables are not significant. Thus, when the bank has a large capital ratio and experiences economy growth, they tend to earn more profits. For ROE, capital ratio, deposit ratio, and inflation are negatively impact banks' profitability, while GDP growth and bank size are positively related to ROE. Thus, large banks at good economic cycle appear to make more profits.

For risk-taking measures, surprisingly our models show that all the chosen independent variables have no significant impact on LN Z-score and non-performing ratio. However, total deposit to total assets ratio and bank size are significant in non-interest income ratio. The higher the deposits ratio, the higher risks that banks face, and the larger banks have more ability to bear risks.

2. Literature Review

There are numerous research and papers that study the determinants of banks' profitability and risk taking with different focuses. For bank's profitability, some research shows how variables affect it in one particular country, and some research focus on a panel of countries to seek for generalities. For risk-taking, many studies distinguish between desired risk, which can be defined as risk that accompanies with rewards, and undesired risk, which do not come with rewards. Regardless of which type of research is being conducted, the determinants can be categorized into two sections, which are internal factors and external factors for bank's profitability and risk-taking. Most of these studies use return on asset (ROA) and return on equity (ROE) as dependent variables, and some of them use net interest margin (NIM) as well. For risk-taking, non-performing ratio, non-interest ratio, VaR, and credit ratings are commonly used as dependent variables. The internal and external factors are used as independent variables.

2.1 Internal Factors

Internal determinants that affect bank's profitability and risk-taking are factors that are managed and influenced by decisions and strategies of the board and senior management of a bank. Most common internal determinants include bank size, capital ratio, growth rate of customer deposit, net loan ratio, etc.

Rene (2014) conclude that there's no simple formula for a bank to be effectively manage its risk. Governance, incentive, and culture are also important for risk-taking to maximize shareholders' wealth.

Brissmis, Delis, and Papaikolaou (2008) conclude the size is not a significant determinant of bank's profitability from a study of testing a group of Greek banks from 1985 to 2001 by using GMM technique. In a research of Alhassan (2015), 26 Ghanaian banks were studied to

seek the relationship between its size and profit from 2003 to 2011. He concludes that bigger banks have higher cost and profit efficiency. Kosmidou (2008) also find similar conclusion that bank's size has a positive relationship with profitability in his study of Greek banks' performance during European Union financial integration. However, the relationship is significant only when overall economy and financial structure variables are included in the model as well. Saona (2016) tested the relationship between bank size and profitability in Latin American from 1995 to 2012, and result shows they are significantly positively correlated.

Koehn and Santomero (1980) find that higher capital requirements have a higher risk. Bourke (1989) finds that capital adequacy is positively correlated with profitability, which means a higher capital ratio could bring banks more profit. Brighi and Venturelli (2014) find capital ratio has positive relationship with both diversity and profitability. Furthermore, large banks tend to indulge into more diverse activities. In Liu and Wilson (2010) study of a panel of Japanese banks from 2000 to 2007, they find a positive relationship between capital ratio and profitability. In Dietrich and Wanzenried research, they take the financial crisis into consideration. They find capital ratio is not significantly related to profitability before crisis. However, capital ratio negatively impact bank's profitability after crisis.

Liu and Wilson (2010) find net loan ratio doesn't have a significant relationship with profitability. However, Trujillo-Ponce (2013) suggest that the relationship between the two are positive and significant. Waschiczek (2016) illustrates these two have a significantly negative relationship.

2.2 External Factors

External determinants are factors that affect bank's profitability and risk-taking from macroeconomic environment and development, such as GDP growth, inflation, interest rate. Arpa, Giulini, Ittner, and Pauer (2001) find macroeconomic developments have a positive

impact on both risk and earning of Austrian banks during the 1990s. It also concludes variables such as interest rate is significant in explaining Austrian banks' profitability. Moreover, net interest income seems not correlated with GDP growth and interest rate development.

Liu and Wilson (2010) find that GDP growth rate has a negative relationship with bank's profitability as the competition between banks is induced. Meslier, Tacneng, Tarazi (2014), and Tan (2016) suggest the relationship between GDP growth rate and banks' profitability is positive.

Trujillo-Ponce (2013) finds inflation rate is positively related to profitability, while Kohler (2014) suggest a negative relationship between the two.

3. Data and Variables

3.1 Data

The data examined in this paper covers 30 publicly-traded banks in China over a 6-year period from 2011 to 2016. The data can be divided into internal factors and external factors, which were both obtained from Orbis.

In this paper, we use panel data to analyze determinants of bank profitability and risk-taking. The main advantages of using panel regression are as followed. Firstly, it incorporates time-series data, which focuses on dynamic information, into cross-sectional data, which pays more attention to diversity, so we can analyze various banks over a 6-year period. Secondly, it helps to study the effects of bank-specific factors while controlling macroeconomic factors.

3.2 Independent variables

For independent variables, they are divided into internal determinants, which are about bank-specific characteristics, and external determinants, which are focused on macroeconomic conditions.

3.2.1 Internal factor

Bank size: The size of the banks can be defined as total assets, which are found from the banks' balance sheets. Here, the reason why we take logarithm of total assets is that total assets are required to be normally distributed to be analyzed by ordinary least square regression model. Bikker and Hu (2002) and Goddard et al. (2004) cited that there is a

positive relationship between bank size and profitability.

Capital ratio: this ratio is always taken as total equity divided by total assets, which shows how a given bank uses internal funds to fund its total assets. Given a bank's capital structure, if this capital ratio is high, the debt-to-assets ratio will be low. The debt-to-asset ratio is a type of solvency ratio, which indicates whether cash flow is sufficient to meet its long-term obligations. Also, if the equity is higher, there will be less interest charges because of lower liabilities, and this will lead to more profits.

Net loan ratio: It is defined as net loans divided by total assets. Loans to total assets ratio measures where banks' income comes from, and it has a positive relationship with bank profitability. Gul et al. (2011) cited that non-interest bearing assets are negatively correlated with profits. It is anticipated that the higher equity-to-asset ratio, the lower the external funding, and thus higher profits. Rumler and Waschiczek(2016) stated that loans to total assets ratio has a significantly negative relationship with ROA and ROE.

Deposits: this is the ratio of total deposits to total assets, which is regarded as a liability. The reason why deposits have great impact on bank profitability is that deposits are the important sources of bank funding. There are still some scholars who state that total deposits to total assets may bring good to a given bank's profitability.

3.2.2 External factors

GDP real growth rate: GDP growth rate is a measure of economic activity. It has significant impact on the demand and supply for banks deposits and loans (Alper&Anbar, 2011). There exists a positive relationship between GDP real growth rate and bank profitability

(Demirguc-Kunt and Huizinga, 1999; Bikker and Hu, 2002).

Inflation rate: This is the percentage increase in Consumer Price Index (CPI) for all final goods and services. The value of costs and revenues can be affected by the change in inflation rate. How Inflation is expected to affect profitability cannot be assured (Perry, 1992). If inflation rate is anticipated, interest rate can be adjusted to improve revenues. Most literatures show a positive relationship between inflation rate and bank profitability (Bourke, 1989; Molyneux and Thornton, 1992; Hassan and Bashir, 2003; Kosmidou, 2006).

3.3 Dependent variables

3.3.1 Profitability measures

In this paper, bank profitability is studied first as the dependent variables. There are various profitability ratios that can measure bank profitability. In this paper, we choose return on equity (ROE), which is defined as net income divided by average total equity, and return on assets (ROA), which is defined as net income divided by average total assets. ROA can measure the profit earned per dollar of assets and show how a given bank uses its resources to generate profits (Alkassim, 2005). The difference between ROA and ROE is about debt. The balance sheet's fundamental equation shows that if there is no debt, equity will be equal to asset. However, if there exist debt, ROE will exceed ROA.

3.3.2 Risk-taking measures

Apart from analyzing bank profitability, risk is also a key factor to assess a bank's business condition. To investigate the influences of these internal determinants and external

determinants on bank risk-taking, several measures are chosen as the dependent variables. Three proxies are used to estimate the risk taking of these 30 Chinese banks. Following Boyd and Graham (1986), the Z-score is taken as the return on assets (ROA) plus the capital to assets ratio (E/A) divided by the standard deviation of return on assets. A higher Z-score means the safer the bank. As we have mentioned before, the Z-score is also highly skewed. Thus, we take natural logarithm of the Z-score to make it normally distributed (Laeven and Levine, 2009).

Following Shehzad et al. (2010), We use the non-performing loan ratio (NPL) as a dependent variable. NPL can be calculated as non-performing loans over total loans. A higher NPL means that the bank may be faced with higher credit risk because non-performing loans always give rise to losses for banks (Delis and Kouretas, 2011).

Bank profitability always results from a fierce growth of non-interest income, which is earned from areas beyond a bank's lending system. Therefore, we introduce non-interest income ratio, which can be calculated as non-interest income divided by total interest income. Non-interest income is earnings that banks gain for activities except for deposits accounts. Non-interest income has been characterized by a shift in income from saving accounts to income for mortgage service, mutual funds and derivatives products. What matters most is that increasing noninterest income can help to reduce risk-taking of banks due to more diversification.

4. Methodology

In this paper, we employ ordinary least squares model to run panel regression in order to investigate the effects that internal factors and external factors have on these 30 public-traded Chinese banks' profit and risk-taking.

Following Alper and Anbar (2011)'s study, which explored the effects that internal determinant and external determinants have on bank profitability and bank risk-taking, we use panel data, which consists of 151 observations for 30 banks over a 6-year period from 2011 to 2016. In this model, cross-sectional units are denoted as $i = 1$ to n , and the length of time as $t = 1$ to T .

When using panel data, we should allow for the choice between fixed effects model and random effects model. Fixed effects model has individual-specific effect that is basically correlated with the explanatory variables, while random effects model has individual-specific effect that is uncorrelated with the independent variables.

Robinson (1991) stated that fixed effects are estimated using ordinary least squares (that is, maximum likelihood) and random effects are estimated with shrinkage. Fixed effects are the same for different individuals, and random effects vary a lot (Kreft and De Leeuw, 1998). Random effects models basically result from partial pooling technique for statistical application. In this paper, fixed effects models are used to support the regression.

4.1 Profitability model

$$ROA_{it} = \alpha + \beta_1 * EA_{it} + \beta_2 * NLA_{it} + \beta_3 * DPA_{it} + \beta_4 * GDP_{it} + \beta_5 * INF_{it} + \beta_6 * LNA_{it} + \varepsilon$$

$$ROE_{it} = \alpha + \beta_1 * EA_{it} + \beta_2 * NLA_{it} + \beta_3 * DPA_{it} + \beta_4 * GDP_{it} + \beta_5 * INF_{it} + \beta_6 * LNA_{it} + \varepsilon$$

Where,

EA = total equity/ total assets

NLA = net loans/ total assets

DPA = total deposits/ total assets

GDP = GDP real growth rate

INF = annual inflation rate

LNA = natural logarithm of total assets

α = intercept

ε = error term

4.2 Risk-taking model

$$LNZ_{it} = \alpha + \beta_1 * EA_{it} + \beta_2 * NLA_{it} + \beta_3 * DPA_{it} + \beta_4 * GDP_{it} + \beta_5 * INF_{it} + \beta_6 * LNA_{it} + \varepsilon$$

$$NPR_{it} = \alpha + \beta_1 * EA_{it} + \beta_2 * NLA_{it} + \beta_3 * DPA_{it} + \beta_4 * GDP_{it} + \beta_5 * INF_{it} + \beta_6 * LNA_{it} + \varepsilon$$

$$NIR_{it} = \alpha + \beta_1 * EA_{it} + \beta_2 * NLA_{it} + \beta_3 * DPA_{it} + \beta_4 * GDP_{it} + \beta_5 * INF_{it} + \beta_6 * LNA_{it} + \varepsilon$$

Where,

LNZ = natural logarithm of Z-score

NPR = non-performing ratio

NIR = non-interest ratio

EA = total equity/ total assets

NLA = net loans/ total assets

DPA = total deposits/ total assets

GDP = GDP real growth rate

INF = annual inflation rate

LNA = natural logarithm of total assets

α = intercept

ε = error term

5. Empirical results

5.1 Descriptive statistics

Table 1 shows the descriptive statistics of all the independent variables and dependent variables. Mean, minimum, maximum, standard deviation, and median are shown for each variable. The 30 banks have an average return on assets (ROA) of 1.0552% and average return on equity (ROE) of 16.3047% over the entire period from 2011 to 2016. The standard deviations of ROA and ROE are respectively 0.2402 and 3.1375, which reveals that ROE has fluctuated more than ROA. For those three risk measures, averages of them are respectively 4.1522, 0.0182, and -0.0305. However, we note that the mean value for non-interest income ratio is negative, while the figures for others are positive. The standard deviations for these three dependent variables are respectively 0.4696, 0.0116, and 0.5515. Among those independent variables, net loan ratio has the largest mean value, while inflation rate has the smallest average. Net loan ratio also has the largest standard deviation, which means that it moves a lot from the mean value. For the natural logarithm of total assets, it has an average of 19.3344 and standard deviation of 1.527.

5.2 Correlation matrix

Table 2 presents the correlation matrix between six independent variables. From the table, it is not difficult to see that there are only 2 pairs of independent variables that have very strong correlation with each other, while others have correlation coefficients that are no more than

0.5. Inflation rate and GDP growth rate are strongly correlated with each other (0.93). Also, Deposits ratio and log of total assets have a higher correlation (0.995). This shows that in this study we do not need to allow for the effect of multicollinearity.

5.3 Panel regression results

Table 3 shows the first regression results, which explains how internal factors and macroeconomic factors affect return on assets (ROA) of 30 Chinese publicly-traded banks over a 6-year period from 2011 to 2016. For equity-to-assets ratio, the coefficient is 0.094804, which means that it is positively correlated with bank profitability. Its P-value is almost 0, less than 0.01, which reveals that equity-to-assets ratio is highly significant at 1% significance level. This result is in accordance with theoretical assumptions because higher capital ratio will lead to fewer interest costs, and thus more business profit. Also, GDP is positively related to ROA with coefficient of 0.267249. P-value is 0.0000, which means that GDP significantly affects ROA and is positively related to ROA at 1% level of significance. The result is also in line with our guess before implementing the regression, because in better economic conditions, banks have better performance and make higher profits. However, inflation rate, also as a macroeconomic factor, is negatively correlated with bank profitability measured by ROA (Coefficient is -0.164477). P-value is 0.0012, also less than 1%, which means that inflation rate has a strongly significant relationship with ROA. For other internal factors including net loan ratio, total deposits ratio, and logarithm of total assets, they are found to be insignificant because their P-values are higher than 0.1, which is contrary to what we

expected.

As is shown in **Table 4**, total equity/total assets ratio is negatively correlated with return on equity (ROE) with coefficient -0.866550. Its P-value is 0.0020, which shows that capital ratio has significantly effect on bank profitability measured by ROE. This result is in contrast to our expectation because capital ratio should have been positively related to the bank's ability to earn profits. For total deposits to total assets ratio, it has a negative relationship with return on equity with coefficient -9.008140. P-value is 0.0375, less than 0.05, which means that total deposits to total assets ratio is significant. The result is the same as we anticipated. GDP is shown to be positively related to ROE (coefficient is 4.179371). P-value is 0, which strongly supports that GDP real growth rate has highly significant and positive impact on ROE. As we have seen in the regression result of determinants of ROA, inflation rate is also negatively correlated with ROE, and highly significant (P-value is 0.0019). As for logarithm of total assets, coefficient is 9.136097, which means that logarithm of total assets is positively related to ROE, the same as we expected. P-value is 0.0323, which reveals that logarithm of total assets is proved to be significant at 5% significance level.

Table 5 gives us a surprising result, which is totally contrary to what we anticipated. As an important risk measures, LN Z-score should have been significantly affected by bank-specific factors and macroeconomic factors. However, all the independent variables given in this paper are shown to be insignificant since their P-values are all larger than 0.1, some of which even closer to 1. Referring to R-squared (also called coefficient of determination) and adjusted R-squared in this regression, we find that they are respectively 0.215103 and 0.182171, both of which are relatively low. This means that this model has very low fitting

degree.

Table 6 presents how internal factors and external factors play a role in non-performing ratio, another important risk measure. In this model, like the model for LN Z-score, all the independent variables have been proved to have no significant impact on non-performing ratio, which is contrary to our expectation. Their P-value are very high, some of which are higher than 0.5.

Table 7 is for determinants of non-interest income ratio. Total deposits to total assets ratio's coefficient is 3.819167, which means that total deposits to total assets ratio has a positive relationship with non-interest income ratio, which is exactly what we expected because the higher the total deposits to total assets ratio, the more liability the bank has, which thus may lead to higher risks that the banks has to take. P-value is close to 0, much less than 0.01, which means that total deposits to total assets ratio is highly significant. There is another internal factor that has a negative relationship with non-interest income ratio: bank size, that is, natural logarithm of total assets (coefficient is -3.800799). It also has zero P-value, so it is not difficult to see that bank size significantly affects non-interest income ratio at 1% level of significance. This result confirms our expectation that the higher the LN assets, the better the bank's business conditions, and thus fewer risks that the bank has to take. In this model, R-squared and adjusted R-squared are both very high, which is a positive indicator for a good-fitting model. F-statistic is shown to be extraordinarily high with 794.3808, which further illustrates that this model fits very well. Other variables including capital ratio, net loan ratio, GDP growth rate and inflation rate have proved to be insignificant with regard to their high P-values.

6. Conclusion

Since Banks are faced with rapidly changing circumstances, profitability and risk-taking are what we need to analyze the performance of banks. In this paper, we choose 30 public-traded Chinese banks over a 6-year period from 2011 to 2016 and estimate the effects of different determinants on them. Bank-specific factors are divided into capital ratio, net loan ratio, total deposits to total assets ratio and bank size. Macroeconomic factors are GDP growth rate and inflation rate. ROA and ROE are chosen as profitability measures, while LN Z-score, non-performing ratio, and non-interest income ratio are risk-taking measures.

After running five regression models, our findings are as follows. First, capital ratio and GDP growth rate have significantly positive relationship with ROA, while inflation rate have significantly negative relationship with ROA. Other independent variables seem to be insignificant. Thus, capital ratio and GDP help a bank to earn more profits, while inflation rate may reduce profits. For ROE, capital ratio, deposits ratio and inflation rate significantly affect bank profitability. Their effects are negative and may do harm to a bank's profitability. GDP and bank size are the ones that have positive relationship with ROE and prove to be significant, which means better economic cycles and larger bank size may lead to higher profits.

As for risk-taking measures, results are surprising. Our regression models show that all the independent variables have been proved to have no found effects on LN Z-score and non-performing ratio, which is totally contrary to our expectation. However, total deposits to total assets ratio and bank size are significant in terms of non-interest income ratio, even

though their effects are opposite. Deposits ratio are presented to be favorable for a bank's risk-taking, which means that the higher the deposits ratio, the fewer risks that banks face. What is contrary to our previous anticipation is that bank size (denoted as log of total assets) has significantly negative relationship with non-interest income ratio, which reveals that larger banks are more likely to bear more risks.

However, there is a piece of finding worth to be noticed. Bank profitability measured by ROA is shown to be positively correlated with capital ratio, which is defined as total equity divided by total assets, while bank profitability measured by ROE is surprisingly negatively related to capital ratio. The reasons can be explained as follows. First, return on equity is calculated as net income divided by average total equity. Thus, if capital ratio increases, it is likely that the upward trend of equity brings about the change in the capital ratio. In this way, the denominator of ROE will increase, which leads to the decrease of ROE. This can exactly explain this abnormal phenomenon. Second, debt is the key factor constituting leverage in a firm. During flourishing or normal economic conditions, increasing leverage may lead to considerable opportunities to earn profits. During recession economic conditions, increasing debt may result in losses for firms, which is consistent with the decrease of ROE. This may be explained by more risks carried by large debt burden, which is caused by how leverage reacts to current economic conditions. In our paper, growing capital ratio gives rise to decreasing profitability measured by ROE possibly in booming economic conditions.

As a whole, what we have seen from the regression results are basically reasonable and in line with our expectation.

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Appendix

Table 1: Descriptive Statistics

	Min	Max	Mean	Std.Dev	Median
ROA (%)	0.5530	2.7570	1.0552	0.2402	1.0440
ROE (%)	8.3650	23.3070	16.3047	3.1375	16.0380
LNZ	3.0169	5.0324	4.1522	0.4696	4.2441
NPR	0.0000	0.0904	0.0182	0.0116	0.0169
NIR	-6.7594	0.1038	-0.0305	0.5515	0.0082
EA (%)	4.8134	29.8413	6.6083	2.1313	6.3333
NLA (%)	0.6479	59.2203	43.6834	8.6813	45.6622
DPA (%)	14.4052	21.7629	19.2029	1.5474	19.2996
GDP (%)	6.7000	9.2000	7.4914	0.7664	7.3000
INF (%)	1.5410	4.0600	2.3673	0.7215	2.1230
LNA	16.1304	21.9104	19.3344	1.5217	19.4289

Table 2: Correlation Matrix

	EA	NLA	DPA	GDP	INF	LNA
EA	1.00	-0.23	-0.23	-0.19	-0.14	-0.15
NLA	-0.24	1.00	0.53	0.30	0.24	0.50
DPA	-0.23	0.53	1.00	0.05	0.05	0.99
GDP	-0.20	0.30	0.05	1.00	0.93	0.04
INF	-0.14	0.24	0.05	0.93	1.00	0.04
LNA	-0.15	0.50	0.99	0.04	0.04	1.00

Table 3: Determinants of Return on Assets (ROA)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
EA	0.094804	0.018097	5.238656	0.0000***
NLA	-0.001711	0.002405	-0.711427	0.4780
DPA	0.185225	0.282064	0.656676	0.5124
GDP	0.267249	0.048749	5.482105	0.0000***
INF	-0.164477	0.049927	-3.294331	0.0012***
LNA	-0.165731	0.277964	-0.596231	0.5520
Constant	-1.461783	0.351727	-4.156013	0.0001***
R-squared	0.581805			
Adjusted R-squared	0.564390			
F-statistic	33.38950			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Determinants of Return on Equity (ROE)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
EA	-0.866550	0.275238	-3.148365	0.0020***
NLA	-0.003758	0.036570	-0.102759	0.9183
DPA	-9.008140	4.289910	-2.099844	0.0375**
GDP	4.179371	0.741429	5.636909	0.0000***
INF	-2.402861	0.759345	-3.164388	0.0019***
LNA	9.136097	4.227554	2.161083	0.0323**
Constant	-7.084331	5.349418	-1.324318	0.1875
R-squared	0.433127			
Adjusted R-squared	0.409507			
F-statistic	18.33751			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Determinants of LN Z-Score

Variables	Coefficient	Std. Error	t-Statistic	Prob.
EA	0.066932	0.048489	1.380359	0.1696
NLA	-0.009624	0.006448	-1.492588	0.1377
DPA	0.000692	1.576332	0.000439	0.9997
GDP	0.172011	0.131012	1.312943	0.1913
INF	-0.088257	0.133843	-0.659407	0.5107
LNA	0.159638	1.565937	0.101944	0.9189
Constant	-0.040044	0.953954	-0.041977	0.9666
R-squared	0.215103			
Adjusted R-squared	0.182171			
F-statistic	6.531600			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Determinants of non-performing ratio

Variables	Coefficient	Std. Error	t-Statistic	Prob.
EA	-0.000171	0.000981	-0.174706	0.8616
NLA	0.000155	0.000130	1.188049	0.2368
DPA	-0.002671	0.015295	-0.174663	0.8616
GDP	-0.001842	0.002643	-0.696844	0.4870
INF	0.000744	0.002707	0.274713	0.7839
LNA	0.007411	0.015073	0.491685	0.6237
Constant	-0.067430	0.019073	-3.535430	0.0005***
R-squared	0.470521			
Adjusted R-squared	0.448459			
F-statistic	21.32756			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Determinants of Non-interest income ratio

Variables	Coefficient	Std. Error	t-Statistic	Prob.
EA	0.003804	0.011006	0.345611	0.7301
NLA	-0.001201	0.001462	-0.821105	0.4129
DPA	3.819167	0.171544	22.26351	0.0000***
GDP	-0.039995	0.029648	-1.349007	0.1795
INF	-0.006200	0.030364	-0.204192	0.8385
LNA	-3.800799	0.169050	-22.48324	0.0000***
Constant	0.458254	0.213911	2.142261	0.0339**
R-squared	0.970674			
Adjusted R-squared	0.969452			
F-statistic	794.3808			

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1