

# An Empirical Study on the Influencing Factors of Capital Structure of Listed Banks in China

Shiya Zhou

Wuhan Technology and Business University, School of Management.

Wuhan 430065, Hubei, China

913815637@qq.com

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**Abstract.** This paper makes a statistical analysis of the financial data of 16 listed banks in China from 2008 to 2017, and makes an empirical study based on these data. It finds that the factors affecting the capital structure of listed banks in China are the size of banks, the ability of capital guarantee, the dividend payment rate, the profitability of banks and the development ability of banks. First, I made a simple linear regression analysis of these factors, and tested the impact of individual factors on the capital structure one by one. Then I made multiple linear regression to find out the variables with strong explanatory power.

## 1. Introduction

With the continuous strengthening of international division of labor and cooperation, the pace of economic globalization and financial globalization is accelerating, and China's current financial system is facing a strong impact. At the same time, China's financial system continues to open to the outside world, such as the recent Shanghai-Hong Kong Stock Exchange, with the continuous inflow of hot money and capital flight and other phenomena emerging, China's listed banks in this transition period of financial environment are facing tremendous risks. How to adjust the capital structure of listed banks to reduce risk is imminent [1]. This paper analyses the factors affecting the capital structure of listed banks in China, and studies the degree and direction of their impact, hoping to help the adjustment of capital structure of listed banks.

## 2. Research design

This paper refers to a large number of empirical studies on capital structure, and chooses five explanatory variables: bank size, capital guarantee ability, bank profitability, bank development ability and dividend payment rate. The details are as follows:

### 2.1 Capital structure

There are many ways to express the capital structure, such as asset-liability ratio, equity multiplier, debt ratio and so on [2]. Among them, asset-liability ratio is the most common one. However, considering the particularity of the financial industry, especially the financing sources of listed banks are mainly concentrated in customer deposits. The asset-liability ratio of listed banks is basically over 90%, which is too similar. So this paper chooses the debt ratio as an index to measure the capital structure. Debt ratio = Total debts / total owner's equity.

### 2.2 Bank size

Generally speaking, the larger the size of a bank, the more deposits it absorbs and the greater its liabilities, but at the same time, the greater its ability to create profits and the greater its owner's equity [3]. Relatively speaking, the increase of owner's equity is faster, so it is assumed that bank size is negatively correlated with capital structure. The size of the bank here is expressed by the natural logarithm of the total assets. The size of the bank is total assets.

### **2.3 Capability of capital guarantee**

Generally speaking, the higher the value of a firm's fixed assets is, the more loans it receives as collateral [4]. Therefore, it is assumed that the ability of capital guarantee is positively related to the capital structure. Here the capital guarantee capability is expressed by the fixed assets ratio, which is equal to the net fixed assets/total assets.

### **2.4 The profitability of banks**

Generally speaking, the higher the profitability of a bank, the higher its profit and the higher its retained earnings [5]. When the bank needs money, it can directly carry out internal financing instead of external loans, resulting in lower liabilities. Therefore, it is assumed that profitability is negatively correlated with capital structure. The profitability here is expressed by net operating interest rate. Net operating interest rate = net profit / total operating income. Total operating income is chosen because some off-balance sheet business of banks is not reflected in the operating income.

### **2.5 Development Ability of Banks**

Generally speaking, banks must need a lot of financing during the development period, which will inevitably lead to increased liabilities. As banks enter the mature period, the development speed will decline, and when there is no better investment opportunity, they will inevitably return liabilities to reduce costs. Therefore, assuming that development capacity is positively correlated with capital structure, the development capacity here is expressed by the growth rate of gross operating income, which is equal to the growth rate of gross operating income (gross operating income of the current year - gross operating income of the previous year) / gross operating income of the previous year.

### **2.6 Dividend Payment Rate**

Generally speaking, the higher the dividend payment rate, the less the retained earnings and the less internal financing can be carried out, which will lead to the increase of external financing and the increase of liabilities. Therefore, it is assumed that the dividend payment rate is positively correlated with the capital structure, and the dividend payment rate is equal to the dividend/net profit.

## **3. Empirical Analysis**

### **3.1 Sample selection**

This paper chooses 16 banks listed on A-share market as research objects, including Ping An Bank, Bank of Communications, Bank of Nanjing, CITIC Bank, Construction Bank, Bank of China, Industrial and Commercial Bank, Beijing Bank, Ningbo Bank, China Merchants Bank, Pudong Development Bank, Agricultural Bank, Industrial Bank, Minsheng Bank, Huaxia Bank and Everbright Bank. The financial statements of the past 10 years from 2008 to 2017 were sorted out. Quarterly financial reports and semi-annual financial reports were excluded. At the same time, 124 groups of sample observation data were selected because of the imperfection and lack of choice of annual financial reports in 2014. Data comes from Guotai'an database.

### **3.2 Research methods**

This paper uses EView 6.0 software to do statistical analysis. Firstly, it makes a simple linear regression analysis of the factors affecting the capital structure of banks, examines the influence of individual factors on the capital structure one by one, and then carries out far-range linear regression, finds out the variables with strong explanatory power, and establishes the optimal explanatory model. The purpose of simple linear regression is to avoid ignoring variables with weak explanatory power. This paper sets the dependent variable as Y, the independent variable bank size as X1, the capital guarantee ability as X2, the bank's profitability as X3, the bank's development ability as X4, and the dividend payment rate as X5 to do the correlation regression analysis.

### 3.3 Univariate linear regression test

#### 3.3.1 Capital structure and bank size

$$Y = 71.1 - 1.86X_1 \quad (1)$$

$$R^2 = 0.10 \quad t = -3.77 \quad P = 0.0003$$

From the above formula, we can see that the size of the bank is negatively related to the debt ratio. The size of the bank affects its debt level. The larger the size of the bank, the lower its debt level, which is consistent with previous assumptions.

#### 3.3.2 Capital Structure and Capital Guarantee Ability

$$Y = 17.90 + 146.89X_2 \quad (2)$$

$$R^2 = 0.003 \quad t = 0.64 \quad P = 0.5222$$

From the above formula, we can see that the guarantee ability of capital does not significantly affect the debt ratio, which is inconsistent with the traditional view that the higher the value of fixed assets, the more mortgages can be obtained, and the greater the debt. The reason may be that the more fixed assets the bank has, the more off-line outlets it has, the higher the growth of the bank, the more its internal funds can meet the growth needs, so it is not necessary to increase the debt ratio.

#### 3.3.3 Capital structure and bank profitability

$$Y = 42.99 - 68.18X_3 \quad (3)$$

$$R^2 = 0.61 \quad t = -13.70 \quad P = 0.0000$$

From the above formula, we can see that the profitability of a bank significantly affects its debt ratio, and the impact direction is negative. The stronger the profitability of a bank, the lower its debt level, which is consistent with previous assumptions. The reason is that the higher the profitability of banks, the higher their profits, the higher the retained earnings. When banks need funds, the principle of profit maximization will consider internal financing to reduce the cost of capital, rather than debt financing.

#### 3.3.4 Capital structure and bank development capability

$$Y = 17.91 + 2.22X_4 \quad (4)$$

$$R^2 = 0.005 \quad t = 0.72 \quad P = 0.473$$

It can be seen from the formula that although the capital structure is positively correlated with the bank's ability to develop, the bank's ability to develop does not significantly affect the debt ratio, which is inconsistent with the assumption that fast-growing banks need a lot of external financing. The reason may be that the choice of indicators of development capacity needs to be calculated (total revenue of the current year - total revenue of the previous year)/total revenue of the previous year. However, as the first year's data, there is no total revenue of the previous year, which leads to the lack of a lot of data and affects the test analysis.

#### 3.3.5 Capital Structure and Dividend Payment Rate

$$Y = 24.82 - 25.47X_5 \quad (5)$$

$$R^2 = 0.17 \quad t = -5.06 \quad P = 0.0000$$

From the above formula, we can see that the dividend payment rate has a significant impact on the debt ratio, and the impact direction is negative. The more dividends the bank pays at the end of the year, the lower its debt level, which is inconsistent with previous assumptions. Considering the principle of profit maximization, the reason why banks can enlarge dividends is that without better investment opportunities, they do not need external financing, and the reduction of debt level is also justified.

Finally, the above results are summarized in Table 1. From the linear regression, we can see that the size of the bank, the profitability of the bank and the dividend payment rate have a significant

impact on its debt ratio. Among them, profitability is the most important factor affecting the capital structure of banks.

Table 1. Analysis results of unary linear regression

Independent variable	Regression coefficient	R <sup>2</sup>	P	Direction of influence
Bank size	-1.86	0.10	0.0003	-
Capital Guarantee Capacity	146.89	0.003	0.5222	Not significant
Profitability	-68.18	0.61	0.0000	-
Development ability	2.22	0.005	0.473	Not significant
Dividend Payment Rate	-25.47	0.17	0.0000	-

### 3.4 Multivariate Linear Regression Test

Because there are multiple collinearities among the explanatory variables in the sample, stepwise regression analysis is carried out for each explanatory variable in order to establish the best model of influencing factors of bank capital structure (see Table 2).

Table 2. Multivariate stepwise regression analysis results

Model		Regression coefficient	t	P
1	constant	42.99	23.71	0.0000
	Profitability	-68.18	-13.71	0.0000
2	constant	43.67	24.67	0.0000
	Profitability	-63.05	-12.32	0.0000
	Dividend Payment Rate	-10.72	-2.99	0.0033
3	constant	44.56	21.38	0.0000
	Profitability	-60.87	-11.64	0.0000
	Dividend Payment Rate	-12.20	-3.32	0.0012
	Development ability	-4.77	-2.41	0.0178
4	constant	62.59	6.48	0.0000
	Profitability	-59.47	-11.40	0.0000
	Dividend Payment Rate	-9.53	-2.45	0.0159
	Development ability	-5.02	-2.56	0.0118
5	scale	-0.67	-1.91	0.0587
	constant	61.11	6.28	0.0000
	Profitability	-61.94	-10.99	0.0000
	Dividend Payment Rate	-7.29	-1.68	0.0952
	Development ability	-4.64	-2.33	0.0213
	scale	-0.56	-1.56	0.1214
	Capital Guarantee Rate	-193.91	-1.15	0.2496

It is not difficult to see from the table above that in model 3, profitability, dividend payment rate and development ability can significantly affect the level of banks' liabilities. In model 4, independent variable bank size is added. Its p value is greater than 0.05, which exceeds the limit value, and has no significant impact. At the same time, in model 5, it can be seen that bank size and capital guarantee rate can not significantly affect the structure of banks' liabilities. In the construction of the optimal model, it should be eliminated, so model 3 is the best model that can reflect the factors affecting the capital structure of banks.

$$Y = 44.56 - 60.87X_3 - 12.20X_5 - 4.77X_4 \quad (6)$$

#### 4. Research results

Through the optimal model, it is not difficult to see that the size of banks and the relationship between capital guarantee rate and their capital structure is not significant, while profitability, dividend payment rate and development ability can significantly affect the capital structure of banks. Among them, the most influential is the profitability of banks, so how to actively adjust the capital structure of banks to achieve the optimal, we can focus on the profitability of banks. Of course, this paper only uses the debt ratio as the index to measure the capital structure of banks, and only a part of many factors are selected. Some problems may arise in the application of statistical analysis software. Therefore, further research is needed to improve it.

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