A Micro Perspective Study on Non-performing Loans

Based on the Panel Data of Yunnan Tonghai County

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Abstract—**With the continuous reform and development of the financial industry and China's supply side structural adjustment, China Commercial Banks' Non-Performing Loans (Hereinafter "NPL") showed a "double rise" trend, which raises the issue of NPL again into people's attention again. NPL is the leading indicators of financial crisis and the rising NPL rate seriously threatened the sustained and stable development of China's economy. Therefore, it is of great practical significance to analyze the influencing factors of NPL ratio of commercial banks. By using the panel data of Tonghai County in Yunnan Province, this paper focus on the micro factors that impact NPL. It is concluded that the concentration rate of investment in industries, the structure of the loan invested in the enterprises and the way of loan guaranteed electronic document have an impact on the overall NPL ratio of the banking industry and are positively correlated.**

Keywords—NPL; commercial banks; industry investment concentration; investment structure; ways of guarantees

I. INTRODUCTION

According to the statistics from China Banking Regulatory Commission, by the end of year 2016, the balance of NPL of commercial banks was 1.51 trillion yuan and the NPL ratio was 1.74%, which increased by 0.07% compared to 2015. The quality of banking assets in Yunnan is not optimistic. In the end of March 2015, the balance of NPL of banking institutions in Yunnan was 45.914 billion yuan, an increase of 24.191 billion yuan compared with the beginning of the year. The non-performing rate was 2.16%, rising 1 percentage point from the beginning of the year. The NPL rate is affected by both internal and external factors. The higher NPL rate is, the riskier bank operational risk is. With the increasing competition, dealing with NPL and protecting credit assets is the most pressing issue for commercial banks. China still has a large number of NPL, which restricting the commercial bank's profitability and future development (Wei, 2016) [1]. It is important to strengthen the management of NPL of commercial banks. From the micro level, the loan business is the main business of the bank, and the loan risk is one of the major risks for commercial banks. Therefore, the management of NPL has always been the core of bank operation and management. By improving the bank's ability to prevent and control NPL, it can help not only strengthen their profitability, but also the ability to prevent other risks. From the macro aspect, the

healthy development of the financial industry is necessary to maintain the steady operation of the national economy.

In recent years, China's commercial banks have been facing a new situation. With the age of big data and the rapid development of Internet finance, the new situation has brought new factors to the loan risk of commercial bank. Commercial banks cannot stay in the traditional risk control level. New factors need to be found out and effective measures need to be taken to control the risk of loans better. This paper will do an empirical study of the influencing factors of NPL from the micro perspective, which includes the loan guarantee method, investment in the industry concentration, and investment in the enterprise structure.

II. LITERATURE REVIEW

A. The Definition and Classification of Bank NPL

The NPL of commercial banks is that banks cannot recover from their loans and lose normal interest income (Chen, 2010) [2]. Wang (2010) [3] considered that NPL refers to that if borrower over the contract period is not scheduled to repay the principal and interest, the loss of the loan that the bank suffers. Modern commercial banks engaged in a number of businesses, such as stock bond investment, trust agency business and various direct investments, rather than simply lending, so the form of bad assets has become diverse. NPL referred to in this article mainly refer to the NPL arising from the loans issued by commercial banks.

In 2001, the People's Bank of China issued the Guidelines on Classification of Loan Risk and the Five Grades Judgment System of loan assets is adopted by commercial banks to replace the one overdue- two slacks system, which had been in use for many years. Commercial banks have classified loans into five categories, which are named normal, interest, secondary, doubt and loss. Among them, the secondary, doubt and loss are called NPL.

B. Factors that Influence the NPL

From the macro perspective, a lot of researches have been done. Fofack (2005)[4] studied the financial crisis in the 1990s and found that there was a strong causal relationship between macroeconomic volatility and NPL. By using the 25 countries' sample analysis, Pesaran (2006)[5]

explore the macroeconomic factors for the impact of credit assets, which shows that domestic and foreign economic fluctuations have a close relationship between NPL. Debock & Demyanets (2012)[6] concluded that there were some correlations between NPL and macroeconomics in 25 emerging market countries such as China, Colombia, Brazil, Argentina and Chile from 1995 to 2010, indicating that the slowdown of NPL will increase the quality of credit assets. Chen (2015)[7]established a regression model and stated that macroeconomic factors and negative loans are negatively correlated. Among them, the increase in fiscal revenue and total imports and exports reduce the NPL to banks. Zhou (2015) [8] analyzed the bank's capital adequacy ratio, cost rate, the relative size of banks, and GDP growth rate's impact of NPL.

At the same time, internal micro-factor can also impact the NPL rate. Podpiera & Weill (2008) [9] used the data of the Czech banking industry from 1994 to 2005 to establish a mathematical model and the results show that a negative correlation between cost efficiency of banks and NPL. Louzis and Voulds (2011) [10] found out that the macroeconomic factors and the internal factors of bank (such as non-interest income ratio, rate of shareholder's equity) affect the quality of bank loans jointly.

Lots of empirical studies are based on macro-level. This paper will find out whether investment structure, industry investing concentration and way of guarantees will have an impact on NPL.

III. RESEARCH METHOD

A. Sample Selection and Data Resources

This essay uses the data of Tonghai County's Commercial Banks from March 2012 - March 2015 and it includes seven bank branches in Tonghai County, which includes China Construction Bank, Agricultural Bank of China, Industrial and Commercial Bank of China, Bank of China, Rural Credit Cooperatives, Postal Savings Banks and China Merchants Bank. The non-performing loan rate of commercial banks is derived from the quarterly statements issued by the China Banking Regulatory Commission.

B. Research Hypothesis

Commercial banks' NPL are mainly concentrated in the manufacturing sector, wholesale-retail industry and real estate industry. Manufacturing became the fastest and most vigorous sunrise industry in the national economy. "Made in China" by virtue of the low cost of low-cost sales have occupied the "world factory" status, but it has suffered heavy losses in recent years. On the one hand, the economic downturn makes the market demand continues to decline, and some Southeast Asian countries have begun to develop the manufacturing industry, making the export volume to be shrink. On the other hand, the rising cost of land and labor costs has also led to the disappearance of China's low-cost sales. Some foreign manufacturing industry began to return

to the developed countries, which caused a great blow to the Chinese manufacturing.

The capital profitability makes the bank credit put centralized for a long time, easily lead to the liquidity risk of banks, and then bring up the concentration risk of loans. The research of Sun (2008)[11] showed that the intervention of the state policy, the change of the bank management concept, the restriction of the credit management system and the preference of credit output are the main factors leading to the concentration of credit. It is found that although the diversification of loans increases the bank cost, it reduces the bank risk and increases the profit. Accordingly, this paper proposes Hypothesis 1 and Hypothesis 2.

- H1: Bank credit to industry concentration will have a positive influence on the overall non-performing loan ratio if other conditions remain unchanged.

- H2: In the other conditions remain unchanged, the bank credit to invest more concentrated in the enterprise structure, the greater the positive influence on the level of non-performing loan ratio.

Bank loan guarantees are also closely linked to NPL. Traditional researches believed that the mortgage loans have the lowest risk, followed by the guarantee, while the credit model has the highest risk. However, from the situation of NPL of Tonghai County, Yunnan Province in recent years, the risk of the joint guaranteed loans has increased year by year. The risk spread among individual borrowers, and then lead to greater risk. Due to the fund shortage of small and micro businesses, joint guaranteed loans could help them to finance in the initial stage. However, only when one of them comes into problems, it will become the risk center and then spread around the guarantee circle (Dong, 2014) [12]. Considering the risk, banks will reclaim the loan from more businesses outside the guarantee circle, and other businesses in the guarantee circle will face problems at the same time. Accordingly, this paper put forwards hypothesis 3.

H3: In the other conditions remain unchanged, the higher the proportion of banks' joint guaranteed loads, the greater the risk to the credit assets of banks.

C. Variable Designs

In this paper, industry investing concentration, investment structure and the way of guarantees are chosen as the explanatory variable. The bad loan rate of Tonghai county banking is adopted as the explained variable. To eliminate the possible heteroscedasticity between variables, natural logarithmic process is used. See "Table I" for the variables design.

TABLE I.   VARIABLE DESIGN

Variable Types	Variable Names	Variable Notation	Variable Definition
Explained Variable	NPL Ratio	NPLR	(Subprime Loan+Doubtful loan+Loss Loan)/ Total Loans
Explanatory Variables	Industry Investing Concentration	JZD	(Manufacturing+ Real Estate +Wholesale Retail) / Total Loans
	Investment Structure	HYJG	The Loans of Small and Micro enterprise/ Total Loans
	The Way of Guarantees	DBFS	Joint Guaranteed Loans/ Total Loans

IV.   DATA ANALYSIS

A. Model Introduction

Based on the hypothesis, the model is established as follows.

$$NPL = \alpha + \beta_1 JZD + \beta_2 HYJG + \beta_3 DBFS + \epsilon$$

B. Statistic Description

Taking the NPL of six banks County as sample in Tonghai from March 2012 to March 2015, 91 observations are recorded. The results of survey samples as follows: the mean of NPLR is 0.013, the minimum is 0.005, the maximum is 0.031, and the variable bias toward minimum. DBFS's mean is 0.268, the maximum is 0.439, the minimum is 0.149, and the data distribution is more uniform. JZD's mean is 0.303, the maximum is 0.430, and the minimum is 0.169. HYJZD's mean is 0.705, the maximum is 0.463, the minimum is 0.928, and the distribution is relatively uniform. "Table II"

TABLE II.   DESCRIPTIVE STATISTICS OF THE VARIABLES

Variable	Obs	Mean	Std. Dev.	Min	Max
NPLR	91	0.013	0.006	0.005	0.031
DBFS	91	0.268	0.061	0.149	0.439
JZD	91	0.303	0.063	0.169	0.430
HYJG	91	0.705	0.109	0.463	0.928

C. Regression Results

Using the fixed-effect model, it can be seen from the F test that the F value is 10.46 and its corresponding probability value is 0.000. "Table III"

TABLE III.   FIX-EFFECT REGRESSION MODEL

nplr	Coef.	Std. Err.	t	P>t
dbfs	0.005**	0.002	2.520	0.012
jzd	0.070***	0.019	3.780	0.000
hyjg	0.039***	0.010	4.040	0.000
_cons	0.008	0.007	1.220	0.226
R-squared	0.260			
F(3, 87)	9.500			
Prob > F	0.000			
F test that all u_i=0: F(6, 81) = 10.46 Prob > F = 0.0000				

a. Note: ***, **, *mean significant at 0.01, 0.05 and 0.1levels, respectively.

D. Correlation Analysis

In order to study the influence of each variable, the correlation analysis of the variables was carried out. If the correlation between the explanatory and explanatory variables and the independent variables is high, the model is meaningful for the study. If the correlation among the independent variables is too high, meaning the multiple co-linearity among the variables is strong; the model regression results are unreliable. In order to study the correlation between the two variables, the correlation between the variables was analyzed and the significance of the correlation was examined. "Table IV"

TABLE IV.   CORRELATION ANALYSIS

	nplr	dbfs	jzd	hyjg
nplr	1.000			
dbfs	0.019	1.000		
	0.860			
jzd	0.245**	0.024	1.000	
	0.019	0.822		
hyjg	0.205*	0.345***	0.482***	1.000
	0.051	0.001	0.000	

b. Note: 0.3-0.5 is weakly correlated, 0.5-0.8 is medium correlation, and 0.8 is strong correlation. ***, **, *mean significant at 0.01, 0.05 and 0.1levels, respectively

E. Summary

From the above analysis, the following conclusions are drawn: JZD has the greatest positive impact on the nonperforming loan ratio. For every 1% increase in the industry concentration, the NPL ratio is increased by 0.07%. H1 is validated.

HYJG is positively correlated with the NPL ratio, so H2 is validated. Through the analysis, the increase of the scale of small micro-enterprise loans to the bank has a positive effect.

There is a positive correlation between guaranteed loan ratio and NPL ratio, assuming that H3 is validated. Tonghai County is a private economy developed areas, and its joint guaranteed loans are favored by commercial banks and enterprises. But due to the macroeconomic downturn in recent years, the enterprise capital chain breaks. The original "Group-Gathering Heating" turns into a "group overdue", dragging each other and triggering a chain of credit crisis. This has had a huge impact on the quality of credit assets of urban commercial banks and rural financial institutions.

V.   CONCLUSION

Under general conditions, the concentration degree of commercial banks and the credit risks are positively correlated with each other. The higher the concentration degree is, the higher the credit risks are, the more scattering the loans are, and the smaller the risks are facing commercial banks. Among the total borrowings in Tonghai County, Yunnan Province, the borrowed amount of micro, small and

medium-sized enterprises accounts for as high as 70%. Other industrial operators borrow little or do not borrow any. This is similar to the condition of placing all eggs in a basket. The risks are high. Thus, it is suggested that the bank should adjust its loan structure to on the one hand control loan issuance for micro and small enterprises and avoid concentration of major borrowers. On the other hand, attention should be paid to emerging industries so as to diversify customer resources, further expand the credit market, expand the quality customer group, increase the total borrowings, and scatter industrial distribution to prevent occurrence of systematic risks. To be specific, there are four management strategies that the bank can adopt to cope with the problem of NPL.

First, actively expand the new industrial areas. Take press, publication, culture, education and healthcare units in the non-production circulation field for example. They have already turned into an economic entity with one main business section and multiple subsidiary business sections. The business layout has helped them achieve favorable economic benefits. Therefore, based on industrial characteristics of travel agencies, hospitals, schools, newspaper enterprises, TV stations and publishing houses, a qualitative and quantitative analysis can be conducted to confirm quality of customers and strengthen support for quality customers to meet their temporary capital turnover demands in building or expanding new infrastructure, updating or transforming fixed assets, purchasing equipment for scientific research, teaching and medical treatment.

Secondly, personal loan services should be developed vigorously. The NPL rate is far lower among individual loans than that of corporate loans. However, data show that individual loans account for an extremely low percentage among in the municipal branches of the bank. There is still huge room for improvement. To achieve the goal, it is necessary to give full play to advantages of the bank's personnel, retails, facilities and capitals, and focus on development of individual housing loans so as to accelerate and promote personal car consumption loans, limited personal credit consumption, and personal commercial housing loans. In this way, a consumption credit business system will be taken shape to help seize more shares from the consumer credit service market.

Thirdly, innovative service products are to be developed. It is necessary to transform the traditional credit products with a high degree of homogenization to personalized financial service, which is customer need-oriented. It will help bind transactions with business credit of core enterprises to effectively control risks.

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