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Analysis of Factors Affecting the Loan Growth of Banks with a Focus on Non-Performing Loans

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Abstract: The purpose of this paper is to investigate the intertemporal relationship between the non-performing loan ratio and bank lending and to analyze factors affecting loan growth using data from Mongolian commercial banks. There has been a lack of research on Mongolian banks' lending behavior due to their short history. Thus, this paper investigates the effect of the non-performing loan ratio on total loan growth using an ordinary least squares (OLS) regression model with panel data. We used bank-related variables such as the loan-to-deposit ratio, provision-to-gross loan portfolio ratio, equity-to-asset ratio, and liquidity ratio, and economic variables such as the real gross domestic product (GDP) growth rate, interest rate, and inflation rate. The results of this paper show that non-performing loans have a significant negative impact on total loan growth. The implication of this result is that non-performing loans affect banking efficiency, which, in turn, affects financial stability and the real economy. Moreover, high non-performing loans reduce banks' profits. Also, this paper found that loss reserve and the liquidity ratio have a positive effect on total loan growth, while the effects of the loan-to-deposit ratio and the equity capital ratio were not found to be significant. Additionally, from a macro perspective, the inflation rate has a positive effect on the total loan growth rate, while the interest rate has a positive effect on total loan growth rather than a negative effect. And real gross domestic product (GDP) growth does not affect the total loan growth rate.

Keywords: correlation analysis; regression analysis; pooled regression model; Mongolian commercial banks; non-performing loans; total loans

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1. Introduction

In Mongolia, there has recently been great continued interest in the financial and banking industries, and the number of related business fields is increasing, but there is still no research on awareness of bank loans, which have a significant impact on the qualitative growth of related businesses. In particular, research on Mongolian bank loans, a representative field in the financial services industry, is very insufficient considering its importance.

The solvency of borrowers decreases due to economic difficulties, and the resulting increase in banks' non-performing loans affects credit supply through three channels (Accornero et al. 2017). The three channels leading to total loan supply are as follows. First, an increase in non-performing loans (NPLs) increases risky assets. This reduces the ratio between equity capital and risk-weighted assets. An increase in non-performing loans increases the risk weight when calculating the expected risk–reward ratio, which may lead the bank to decide to reduce its assets. Second, banks with high non-performing loans may reduce operations due to market pressure. If the increase in non-performing loans is not fully compensated at an appropriate risk level, the bank's external funding cost increases, which is one of the reasons for reducing loan supply. Third, the size of non-performing loans can change a bank's risk-taking attitude. Undercapitalized banks are more sensitive to the "risk-taking channel" of monetary policy and tend to lend to less financially sound

borrowers when interest rates are low. The characteristics of this channel are opposite to those of the above two channels, and banks with high non-performing loans are more interested in lending than their competitors.

Previous studies related to Mongolia's financial industry include CheolMong and Choi (2017)'s comparative study on the efficiency of the Mongolian and Korean banking industries; Ku and Enkhjargal (2021)'s study on the implications of China and Korea's financial system reform on Mongolia's financial system reform; Altanzul and Park (2016)'s study on the impact of consumer expectation discrepancy regarding banking service quality on satisfaction, attitude, trust, and loyalty; and Lim and Dugerjav (2014)'s study on Korean and Mongolian bank service quality and relationship formation. Most previous studies on Mongolian banks have focused on banking service quality, and there has been little research on Mongolian bank lending so far.

Solving the problem of non-performing loans from commercial banks is a task that must be solved in Mongolia, where the financial industry is not on track. Therefore, because it is important to study the continuous lending of Mongolian bank users, this paper investigates the impact of non-performing loans on the total loans of Mongolian commercial banks and their credit supply, and finds micro-factors of banks and macro-factors of economic condition affecting banks' lending behavior.

The structure of this paper is as follows: Section 2 reviews previous studies; Section 3 describes the data used in this study and the research model; the analysis and results are presented in Section 4; and Section 5 provides our conclusions and directions for further studies.

2. Literature Review

The non-performing loan rate refers to the ratio of non-performing loans to the total loan amount and is an important indicator of a bank's vulnerability (Lee and Kim 2020). Recent studies on non-performing loans have focused on the determinants of credit defaulters. Their analyses are largely divided into bank micro-factors (such as loan size, capital, financing level, profit, etc.) and macro-factors (such as GDP, inflation rate, unemployment rate, investment level, etc.). Keeton and Morris (1987) found the determinant of bad loans in the United States between 1979 and 1985 to be the energy sector crisis, and Sinkey and Greenawalt (1991) and Gambera (2000) found the determining factor of bad loans in the United States to be macroeconomic variables. Laeven and Majnoni (2003) studied the factors affecting the stabilization of banks' profits and income using quantitative data from 45 countries. They found that banks have little provision for loan losses during economic downturns and that when the economy is suffering, the size of the bank negatively impacts its operations. Fonseca and González (2008) analyzed factors that improve profits by managing banks' loan loss reserves on a similar topic. They found that when investor protection is strong, banks make less effort to improve profits and there are strong formal and personal controls due to accounting transparency and banking restrictions. In other words, when a country's market system and financial system are strong, banks are well stabilized. Messai and Jouini (2013) studied the determinants of non-performing loans for Spanish, Italian, and Greek banks. They determined that credit supply would increase when unemployment and interest rates rose, and that loan supply would decrease when GDP growth and bank profitability fell. Berrospide and Edge (2010) studied bank lending behavior and the impact of bank assets. Credit growth is considered representative of credit behavior, and capital has been shown to have little effect on the growth of credit. Tomak (2013)'s study on bank lending behavior analyzed the determinants of bank lending using a sample of Turkish banks. These previous studies confirmed that there was a strong correlation between bank credit status and non-performing loans, and the results showed that these non-performing loans had a negative impact on the growth of total loans.

Cucinelli (2015) explains how macro-factors such as gross domestic product (GDP), inflation rate, and unemployment rate, and micro-factors such as loan-to-deposit ratio, equity capital ratio, an appropriate ratio of equity capital to total assets, customer deposit

growth rate, and non-performing loan rate factors affect the total loan growth rate. Lee and Kim (2020) used a VAR model to analyze the factors affecting non-performing loans by dividing them into two parts, macro-variables and micro-variables, similar to Cucinelli (2015), using quarterly data from 2011 to 2019. Lee and Kim (2020) studied the impact of six factors, including GDP and money supply (M2) as macro-factors, and loan-to-deposit ratio, equity capital ratio, bank investment size, and business climate index (BCI) as micro-factors, on the non-performing loan rate, and found that the total production growth rate and non-performing loans showed a positive relationship and the money supply growth rate and the bank non-performing loan rate showed a negative relationship. Lee and Kim (2020) conducted a study using panel data from the Bank of China and the Bank of Korea using the least squares method and a fixed effects model, and found that the non-performing loan ratio improved as the loan-to-deposit ratio increased, and while the asset size was negative for the Bank of China, it was positive for the Bank of Korea. Previous studies related to non-performing loans are summarized in Table 1 below. By synthesizing the variables used in existing studies, this paper analyzes how direct variables related to banks and macroeconomic indicators affect banks' lending behavior.

Table 1. Summary of previous studies related to non-performing loans.

Results	References
The determinant of bad loans in the United States is found to be the energy sector crisis.	Keeton and Morris (1987)
The determinant of non-performing loans in the United States is found to be macroeconomic variables.	Sinkey and Greenawalt (1991), Gambera (2000)
The authors perform research on bank stabilization by analyzing quantitative data from 45 countries. Banks have little provision for loan losses during recessions, and when the economy is tough, we see a negative impact on operations depending on the size of the bank.	Laeven and Majnoni (2003)
The authors analyze factors that improve profits by managing banks' loan loss reserves. Banks are more stable when a country's market and financial systems are strong.	Fonseca and González (2008)
The authors study the determinants of non-performing loans for Spanish, Italian, and Greek banks. Credit supply is expected to increase when unemployment and interest rates rise and decrease when GDP growth and bank profitability fall.	Messai and Jouini (2013)
The authors investigate the impact of bank assets on bank lending behavior. Credit growth is considered representative of credit behavior and capital has little effect on the growth of credit.	Berrospide and Edge (2010)
The macro-factors are gross domestic product (GDP), inflation (INF), and unemployment rate (UNEMP), and the micro-factors are loan-to-deposit ratio (LTD), equity capital ratio (E_TA), an appropriate ratio of equity capital to total assets (TIER_1), and customer deposits. The author conducts a study on how nine factors, such as an increase in loans (DEP), non-performing loans (CR), and DUMMY, affect the total loan growth rate.	Cucinelli (2015)
Macro-factors include gross domestic product (GDP) and money supply (M2), and micro-factors include loan-to-deposit ratio (LDR), capital ratio (CAR), bank capital ratio (WMP), and business climate index (BCI). The author studies 6 influencing factors	Lee and Kim (2020)

3. Data Description and Research Methods

3.1. Data

We used the data of six Mongolian commercial banks, including the Khan Bank, Khas Bank, TDB Bank, Golomt Bank, State Bank, and Capitron Bank (https://www.mongolbank.mn, accessed on 1 April 2024). In order to analyze the factors affecting the total loan growth rate of Mongolian banks, financial statements were collected from the websites

of six Mongolian banks from the first quarter of 2016 to the second quarter of 2022. For macro-factors, Mongolian national statistics were used. The information was collected through the committee's website.

3.2. Research Methodology

This paper analyzes data from six banks in Mongolia using a panel regression model by applying the models of Micco and Panizza (2006), Berrospide and Edge (2010), Carlson et al. (2013), and Cucinelli (2015).

Cucinelli (2015) selected gross domestic product (GDP), inflation rate (INF), and unemployment rate (UNEMP) as macro-factors, but in this paper, the central bank's policy interest rate (IR) was selected as a variable instead of the unemployment rate. In addition, Cucinelli (2015) used five micro-factor variables, including loan-to-deposit (LTD) ratio, equity capital ratio (EAR), an appropriate ratio of equity capital to total assets (TIER_1), the increase in customer deposits (DEP), and non-performing loans (NPLs). In this paper, the variables loss reserve (LLP) and liquidity ratio (LR) were considered instead of the appropriate ratio of equity capital to total assets (TIER_1) and the increase in customer deposits (DEP). In other words, the variables introduced earlier, namely non-performing loans (NPLs), loan-to-deposit (LTD) ratio, loss allowance (LLP), equity capital ratio (EAR), and liquidity ratio (LR), were used as micro-factors, and the factors gross domestic product, interest rate, and inflation were used as macro-factors.

Regardless of the cross-sectional and time series characteristics of the panel data, the pooled OLS estimation method uses the same constant coefficient and error term for all units in the panel, the total loan growth rate as the dependent variable, and a model that takes time lag as the independent variables into account.

We used the following regression model to investigate how non-performing loans affect the total loan growth rate using the pooled OLS model:

$$LGR_t = NPL_t + LTD_t + LLP_{t-1} + EAR_{t-1} + LR_{t-1} + GDP_t + IR_t + INF_t + \varepsilon_{i\,t}$$

where loan growth rate is represented by LGR, gross domestic product growth rate by GDP, inflation rate by INF, interest rate by IR, non-performing loan by NPL, loan-to-deposit ratio by LTD, loan loss provision by LLP, equity-to-asset ratio by EAR, and liquidity ratio by LR, and $t-1$ represents time lag.

Table 2 describes the independent and dependent variables for the regression model. The description of each variable is as follows: Loan growth rate (LGR) is used to measure banks' lending types (Laeven and Majnoni 2003; Gambacorta and Mistrulli 2004; Berrospide and Edge 2010; Alessi et al. 2014). The factors influencing this total loan growth rate were considered micro-and macroeconomic variables of the bank. First, micro-factors such as non-performing loans (NPL) and the loan-to-deposit ratio (LTD), loan loss reserve ratio (LLP), equity adequacy ratio (EAR), and liquidity ratio (LR) were considered as follows. Tomak (2013) argued that an increase in non-performing loans (NPLs) worsens loan ratings and reduces lending by commercial banks. The loan-to-deposit ratio (LTD) is the ratio of loans divided by deposits and is an indicator of how much loans are compared to deposits. Lower loan-to-deposit ratios for financing will reduce dependence on single sources, increase bank assets, and reduce market constraints. So, the coefficient was assumed to be negative. Loan loss provisions (LLPs) or loan loss reserves are funds set aside by banks to cover non-performing loans (loans that are not repaid in full due to customer default or loans that provide less interest income by negotiating a lower interest rate). A loan loss provision is the bank's best estimate of what percentage of the loan may not be repaid. Although loan losses are still a loss asset for the bank, the goal of the loan loss reserve is to protect the bank's cash flow, freeing up funds to service other borrowers and depositors. So, the sign of the expected coefficient in front of this variable is positive. The equity adequacy ratio (EAR) is the ratio of equity capital to total assets, which is included in the equation to detect the correlation between bank capitalization and credit supply. This is a key measure of a bank's solvency. Since banks tend to give out more

loans when their solvency is high, the sign of the coefficient is expected to be positive. The liquidity ratio (LR) is a measure of a commercial bank's ability to repay short-term debt. The liquidity ratio determines how quickly a commercial bank's assets can be converted and used to meet emerging liabilities. The higher the ratio, the easier one's ability to pay off debt and avoid default on payments. So, the sign of the expected coefficient in front of this variable is positive. Next, we considered macro-factors because the operations of the banking sector are highly dependent on economic conditions or macroeconomic factors. The main indicators of macroeconomic factors affecting bank credit supply are usually considered to be GDP, inflation rate, and interest rate (Tomak 2013; Klein 2013). The macro-factors are as follows. Gross domestic product is a macroeconomic indicator and one of the most common measures of overall economic activity. When economic conditions worsen and enter a downward trend, the number of non-performing loans in the banking system increases, resulting in a negative impact on the supply of bank loans. However, high economic growth means that banks supply large numbers of loans to the market. This can increase interest income and assets and improve quality. Therefore, the sign of the coefficient of GDP is expected to be positive. The interest rate is determined by the central bank and is the most important interest rate because it affects all interest rates in the economy. The interest rate is the rate at which the central bank pays or charges for deposits or loans from commercial banks. So, the sign of the expected coefficient in front of this variable is negative. Inflation rate is one of the important macroeconomic indicators. Regarding inflation in bank nominal interest rates and asset valuations, Smith et al. (2003) argued that there are spillover effects. The higher the inflation rate, the higher the nominal interest rate. This will increase banks' interest in lending. Therefore, the sign of the coefficient of inflation rate was predicted to be positive.

Table 2. Variable descriptions and hypotheses.

No.	Category	Variable Symbols	Alternative Hypothesis	References
1	Dependent variable	Loan growth rate (GLR)		Laeven and Majnoni (2003); Gambacorta and Mistrulli (2004); Berrospide and Edge (2010); Alessi et al. (2014)
2	Independent variable	Non-performing loan (NPL)	−	Tomak (2013); Cucinelli (2015)
3	Independent variable	Loan-to-deposit ratio (LTD)	−	
4	Independent variable	Loan loss provision (LLP)	+	
5	Independent variable	Equity adequacy ratio (EAR)	+	Cucinelli (2015)
6	Independent variable	Liquidity ratio (LR)	+	Cucinelli (2015)
7	Independent variable	Gross domestic product (GDP) (year on year)	+	Tomak (2013); Klein (2013)
8	Independent variable	Interest rate (IR)	−	Tomak (2013); Klein (2013)
9	Independent variable	Inflation rate (INF)	+	Tomak (2013); Klein (2013); Smith et al. (2003)

Thus, we hypothesized that the micro-factors of non-performing loans and the loan-to-deposit ratio would have a negative (−) effect on the total loan growth rate, while loan loss provision (LLP, loss reserves), the equity adequacy ratio (EAR), and the liquidity ratio (LR) would have a positive (+) effect. Also, we assumed that (i) the gross domestic product (GDP, year on year) of macro-factors has a positive (+) influence on the total loan growth rate, (ii) the central bank's policy interest rate (IR) has a negative (−) influence on the total loan growth rate, and (iii) inflation (INF) has a positive (+) effect on the total loan growth rate.

4. Results

4.1. Descriptive Statistics

The results of the descriptive statistics of each variable are shown in Table 3 below. The banking sector's average annual growth rate of total loans between 2016 and the second quarter of 2022 was 16.2%, and the average rate of non-performing loans was 7.8%. The annual average of the loan-to-deposit ratio was 88.5%, the annual average of loss reserves was 6.3%, the annual average of the equity capital ratio was 9.5%, the annual average of the liquidity ratio was 37.1%, and the annual average of the gross domestic product rate was 3%. The annual average of the interest rate was 10% and the annual average of inflation was 6.1%.

Table 3. Descriptive statistics.

	Mean	Std	Min	25%	50%	75%	Max
GLR	16.2	19.4	−24.7	5.5	11.2	24	107.7
NPL	7.8	2.8	2	6.1	7.5	9.1	15.3
LTD	85.5	19.6	57	71.6	82	93.8	157.2
LLP	6.3	2.7	2.1	4.3	5.7	7.4	13.2
EAR	9.5	1.8	6.2	7.9	9.3	11	13.3
LR	37.1	11.1	14.7	32	38.9	44.8	57.2
GDP	3	5.7	−10.1	1.5	5.6	8.8	14.8
IR	10	2.5	6	9	10	11	15
INF	6	4.1	−0.1	2.8	6.4	8.1	16.1

4.2. Correlation Analysis

We performed a correlation analysis to determine whether there were relationships among the variables. We used the micro-factor variables with time lag, except the non-performing loan. The correlation coefficient between each variable ranged from −0.018 to 0.831. Here, similar to the correlation analyses above, the largest correlation was found between the non-performing loans and loss reserves at 0.831. The results are shown in Table 4.

Table 4. Correlation analysis (when only micro-factors have time lag, except NPL).

	LGR	NPL	LTD	LLP	EAR	LR	GDP	IR	INF
LGR	1								
NPL	−0.018	1							
LTD	−0.159	0.079	1						
LLP	0.113	0.831 **	0.055	1					
EAR	−0.076	0.172 *	0.175 *	0.303 **	1				
LR	0.237 **	0.092	−0.471 **	0.162 *	0.403 **	1			
GDP	0.204 *	−0.030	0.011	0.058	0.020	0.146	1		
IR	0.213 **	−0.112	0.429 **	−0.130	−0.103	0.037	0.086	1	
INF	0.143	−0.016	−0.170 *	0.072	0.136	−0.049	0.079	−0.296 **	1

* denotes 5% significance with *p*-value less than 0.05 and ** denotes 1% significance with *p*-value less than 0.01.

4.3. Results of the Regression Model

We analyzed the regression model with micro-factor time lag variables (except NPL) as follows:

$$LGR_t = NPL_t + LTD_{t-1} + LLP_{t-1} + EAR_{t-1} + LR_{t-1} + GDP_t + IR_t + INF_t + \varepsilon_{it}$$

Table 5 shows the results of the regression model with time lag variables. The R-squared of regression analysis is a statistic that indicates how much the independent variable explains the dependent variable, and was found to be 0.255. The VIP value of the regression analysis was small, less than 4, so there appeared to be no multicollinearity problem.

Table 5. Results of regression analysis (when only micro-factors have time lag, except NPL).

Variables	Unstandardized Coefficient		Standardized Coefficient	*t*-Value	*p*-Value	Collinearity Statistic	
	B	Standard Error	Beta			Tolerance	VIF
Const	1.584	12.388		0.128	0.898		
NPL	−2.137	0.979	−0.296	−2.183	0.031	0.287	3.483
LTD	−0.118	0.123	−0.121	−0.963	0.337	0.333	3.007
LLP	3.034	1.016	0.416	2.987	0.003	0.272	3.672
EAR	−2.349	1.178	−0.213	−1.994	0.048	0.465	2.152
LR	0.364	0.213	0.209	1.71	0.089	0.354	2.821
GDP	0.34	0.25	0.103	1.36	0.176	0.921	1.086
IR	2.393	0.753	0.31	3.178	0.002	0.555	1.803
INF	1.003	0.381	0.211	2.636	0.009	0.826	1.211

Dependent variable: loan growth, R^2 = 0.255, Adj R^2 = 0.213, F = 6.030.

It was assumed that non-performing loans would have a negative effect on the increase in total loans, and as a result, the *t*-value was −2.183 and the *p*-value was 0.031, which showed negative significant results. Next, it was assumed that the loan-to-deposit ratio had a negative effect on the increase in total loans, and the results showed that the *t*-value was −0.963 and the *p*-value was 0.337, which was not significant. In addition, it was assumed that loss reserves had a positive effect on the increase in total loans, and the results showed significant results, with a *t*-value of 2.987 and a *p*-value of 0.003. In addition, it was assumed that the equity capital ratio would have a positive effect on the increase in total loans. As a result, the *t*-value was −1.994 and the *p*-value was 0.048, which showed a negative effect, and the assumption that it would have a positive effect was rejected. It was assumed that the liquidity ratio had a positive effect on the increase in total loans, and as a result, the *t*-value was 1.710 and the *p*-value was 0.089, which was found to be significant at 10%.

Next, looking at the results from a macroscopic perspective, it was assumed that gross domestic product had a positive effect on the total loan growth rate, and the results showed that the *t*-value was 1.360 and the *p*-value was 0.176, which was not significant. In addition, it was assumed that the interest rate had a negative effect on the increase in total loans. As a result, the *t*-value was 3.178 and the *p*-value was 0.002, showing a positive effect at 10%, and the assumption of a negative effect was rejected. Lastly, it was assumed that inflation had a positive effect on the total loan growth rate, and the results were found to be significant, with a *t*-value of 2.636 and a *p*-value of 0.009.

4.4. Discussion and Implications

The non-performing loans due to economic difficulties in recent years are likely to see an increase in transaction volume and a rapid increase in bank loans in mid-2022. However, non-performing loans still appear to be at a high level, so it is necessary to reduce non-performing loans, increase lending, and restore financial intermediation.

The implications of this study are as follows. First, the main reason of non-performing loans in Mongolia is the inefficiency of credit collection. It is important to support the market by creating more options for resolving low-quality loans by refusing to bid or participate in transactions. Second, selling non-performing loans is an effective method for efficient debt collection and bankruptcy procedures. This requires banks to completely separate non-performing loans from their balance sheets. However, the negative impact on the banking system remains an unresolved problem in the real economy. Third, a professional asset management system needs to be introduced to alleviate the burden of non-performing loans in the event of a credit soundness crisis, to create an environment in which financial intermediation continues and allows the economy to circulate.

5. Conclusions

This paper analyzed how non-performing loans affect total bank loans using the data of Mongolian banks because non-performing loans are an indicator of credit risk. During

economic downturns, there is a tendency to provide large amounts of credit to all business sectors except the banking sector. When the economic situation worsens, production in each sector decreases, and as a result, repayment capacity deteriorates, which becomes the reason for the increase in non-performing loans. Thus, the increase in non-performing loans has a negative impact on credit rating, which leads to a possibility that there will be a lack of financial resources for continued normal operation and market expansion. In other words, an increase in non-performing loans due to economic difficulties can have a negative impact on credit supply, creating a vicious cycle that adversely affects economic recovery and slows down the process.

This paper found the following results: (i) non-performing loans were confirmed to be an important factor in determining the supply of bank loans, and have a negative impact on bank lending behavior or credit supply; (ii) the loan-to-deposit ratio had no significant negative effect on total loan growth; (iii) loss reserves showed a positive effect on total loan growth; (iv) the equity capital ratio showed a negative effect on total loan growth, contrary to our expectation; (v) the liquidity ratio had a positive effect on total loan growth; (vi) gross domestic product had a positive effect on the total loan growth rate, but it was not significant; (vii) the interest rate had a positive effect on total loan growth, contrary to our expectation; (viii) inflation had a positive effect on the total loan growth rate.

The implications of this paper are as follows. First, the main cause of non-performing loans in Mongolia is the inefficiency of credit collection. It is necessary to create more options for resolving poor-quality loans and refusing to bid or participate in transactions. Second, the means of selling non-performing loans is effective in efficient debt collection and bankruptcy procedures. Third, in the event of a credit crisis, an environment needs to be created in which the pressure on non-performing loans in the financial sector can be alleviated.

The limitations of this paper include, first, the inability to secure sufficient data on Mongolian commercial banks, and second, the inability to compare the lending behavior of Mongolian banks with banks in other countries. In the future, we need to compare and analyze the lending behavior of Mongolian banks and the lending behavior of banks in other countries using sufficient data.

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