

Macro and Micro Determinants of Bank's Profitability: Evidence from United States

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Abstract. This study investigates the macro and micro variables affecting commercial bank profitability in the United States from 2017 to 2021. The research sample is the nine commercial US banks and the research study develops a panel regression model to analyze the data. This research regards the probability indexes return on average assets (ROAA) and return on average equity (ROAE). The study finds that liquidity risk is one of the most crucial factors affecting profitability, both on ROAA and ROAE. The leverage ratio and capital adequacy negatively influence profitability, especially on ROAE. However, the profitability of these US commercial banks is not influenced by the bank size and the macro determinants, which include the pace of growth of the economy, the rate of inflation, and the rate of lending interest are all factors to consider. The paper also presents recommendations for decreasing the liquidity risks and controlling the risk to maintain a healthier economic environment for the US commercial banks based on the empirical findings.

Keywords: Bank Profitability, United States, Financial Institutions.

1. Introduction

The development of banking industry benefits the overall economic expansion, according to the research of Mihajlovic' and Jovic in 2017 [1]. Any country's banks are extremely important in ensuring the overall success of the economy, according to the research of Saif-Alyousfi in 2020 [2]. According to Dietrich and Wanzenried in 2011, the studies about determinants of profitability in financial institutions are significant due to the fact that bank profitability is critical as the industry's steadiness in money markets and the entire economy [3]. According to Golin and Delhaisein2012, appropriate bank profitability is critical for maintaining bank solvency and allowing them to endure in an unpredictable economic community [4]. Additionally, opinions about the gauges of the productivity of the banks varied from research to research. The research about the determinants of profitability becomes meaningful, especially under the coronavirus background. In this paper, the research will examine the macro and micro factors of bank success among the top 9 largest commercial banks, JPMorgan Chase, Wells Fargo, Citi Bank, Bank of America, U.S. Bank, Truist Bank, PNC Bank, Capital One, and Goldman Sachs over the period from 2017-2021. Many valuable research from many nations and systems examined the factors that influence a bank's profitability. Prior research on the factors that influence bank profitability focused on the 47 Asian countries, Zimbabwe, India, Spain, Vietnam, EU 27 systems, and many countries. In the research by Zampara et al. in 2016, the researchers concluded that the bank profitability was highly influenced by the GDP [5]. In the research by Le and Ngo in 2020, it was discovered that the better-capitalized banking system has poorer profitability [6]. The research from Song et al. in 2019 also evaluated the leverage, which is positively related to profitability [7]. In the research by Petria et al. in 2015, researchers found that credit and liquidity risk, management efficiency, and GDP growth impact ROAA and ROAE in EU 27 banking systems [8]. In Omar 2017, the researcher found that the economic environment is essential for bank profitability [9]. In the research from Dietrich &Wanzenried in 2011, researchers used the regression method in their studies, and their studies fulfilled their expected results at last [3]. However, there are no similar or the same determinants results for different countries. The significant determinants differ across countries and vary periodically. It excites me to look into the predictors of the major US commercial banks to see if the research yields the same or different conclusions as the prior study. Additionally, although they sometimes have the same determinants, the relationship between the variables and the profitability may be adverse and different.

The research would see whether the top largest US commercial banks differ from an extensive bank system or a large sample size.

The study has chosen nine commercial banks as my sample to research. Then, the research collected and aggregated the data from different resources and computed different ratios as my variables. ROAA and ROAE are regarded as the indexes of profitability. Panel regression is the research method, and Stata is the tool the study used for regression. The regression could help us determine which explanatory variables matter and which explanatory variables are controls in this research. After getting the data from the regression, the study analyzed the data and concluded the results.

2. Data and Methodology

The data collection utilized in this study and variables is discussed in this section.

2.1 Data

In the United States, there are several commercial banks, the research chooses top nine largest banks in the USA, according to the total assets ranking in 2021, as the research sample for 2017-2021. The nine commercial banks the study used are JPMorgan Chase, Wells Fargo, Citi Bank, Bank of America, U.S. Bank, Truist Bank, PNC, Capital One, and Goldman Sachs. Data are collected from different resources. The data are mainly collected from the Wall Street Journal On the company's website, there is a repository and yearly reports for the commercial reports from the investor relations section. The annual GDP growth, inflation, and lending interest rate are collected from the World Bank and Fred Database.

2.2 Variables

Variables include explanatory variables and dependent variables. Explanatory variables comprise two main parts: micro determinants and macro determinants. Bank size, leverage ratio, liquidity risk, and capital sufficiency are micro factors. Macro variables comprise the growth rate of GDP, inflation, and interest of lending. (ROAA) and (ROAE) are dependent variables. Previous studies, for example, Adelopo et al. in 2017 and Ali and Pauh in 2018 covered the different following variables: bank size, leverage ratio, liquidity risk, capital adequacy, GDP, inflation rate, and lending interest rate [10, 11].

2.2.1. Explanatory Variables

I. Size (Bank Size)

Much previous research utilized the total assets to measure the scope of the bank. Specifically, the total assets' logarithm was applied to estimate the size of the bank. The results of their study differed a lot - some of them believed the bank size hurt the profitability [12], and some of them believed the size has a beneficial influence on profitability.

II. Lev (Leverage Ratio)

The leverage ratio can show the financial stability of a commercial bank. According to Bose et al. in 2017, the leverage ratio is defined as total debt to total assets, which means how many assets can be used to finance the debts [14]. The increasing leverage ratio is due to lower ROAA and ROAE.

III. L-risk (Liquidity Risk)

According to Anitha and Priya in 2019, liquidity risk implies the bank's powerlessness to meet its present and future monetary commitments on time or failure to raise extra assets to meet the liquidity needs [15]. The study expects that higher the liquidity would lead to lower return on average assets and equity, representing a negative relationship.

IV. CAD (Capital Adequacy)

The equity to total assets ratio is used to determine capital adequacy [13]. It is a crucial factor because it can reflect stability of a bank. The study expects the higher capital adequacy would result in higher ROAA and ROAE.

V. GDP (GDP annual growth rate)

GDP is vital for all industries in all countries. An excellent economic environment can contribute to the healthier growth of commercial banks. Therefore, the study expects that the higher the GDP, the greater profitability the banks have.

VI. Inflation (Inflation rate)

Inflation is an economic term and it denotes an increase in the price of the price for products and services because of the rising price of raw materials, disrupted supply chain, and other factors. The study expects a positive relationship between inflation and profitability because certain inflation can stimulate the economic growth.

VII. LII (Lending Interest Rate)

The lending interest rate is the rate charging the customers when the banks grant loans. The study expects that the higher the lending interest rate, the higher the profitability the banks have. However, previous research showed a negative link between interest rate and profitability [16].

2.2.2 Dependent Variables

The majority of previous research use ROA, computed as net profit over the bank's total assets, and ROE, measured as net profit over total equity of the bank, to measure profitability [7, 9]. The study uses ROAA and ROAE for the five years as the dependent variables, the same as Petria et al. in 2015. The study of return on average assets for a whole year is more accurate than the return on assets on end of each year. Some research used the return on average assets and equity [8]. Table 1 lists the factors included in the study and the expected impact on profitability.

Table.1. Description of variables

Symbol	Variables	Proxy	Expected Sign
<i>Dependent Variables</i>			
ROAA	Return on Average Assets	Net profit/Average Assets	
ROAE	Return on Average Equity	Net profit/ Average Common Stock Equity	
<i>Independent Variables</i>			
<i>Microeconomic indicators</i>			
Size	Bank Size	Logarithm of Total Assets (log)	±
Lev	Leverage Ratio	Total Debt over Total Assets	-
L-risk	Liquidity Risk	Total Deposits over Total Assets	-
CAD	Capital Adequacy	Equity over Total Assets	+
<i>Macroeconomic indicators</i>			
GDP	Economic Activity	GDP growth (annual %) - United States	±
Inflation	Inflation	Inflation, GDP deflator (annual %)	+
LII	Interest Rate	Lending interest rate (%) - United States	+

3. Results

This segment analyzes the empirical results in three sections. The descriptive statistics of the variables employed in this study are covered in the first part. The second section discusses the results of panel regression analysis. The third section is a further discussion.

3.1 Descriptive statistics

The descriptive statistics are presented in Table 2. The ROAA is 1.41%, and the average ROAE is 14% from 2017 to 2021. The ROAA does not vary significantly, with a standard deviation of 0.562%. The maximum and minimum of ROAA are 2.88% and 0.96%. The standard deviation of ROAE is 4.19%, with a maximum of 21% and a minimum of 9.19%. The mean of the bank size (Logarithm of bank assets) is 3.003, with a maximum of 2.350 and a minimum of 3.570. The average leverage ratio

is 18.2%, which is an essential indicator of the profitability of commercial banks. The average ratio of the deposit is 61.8%, which infers a moderately high rate of deposits in the nine US commercial banks. The maximum capital adequacy is 14.9%, and the minimum is 7.51%, and the capital adequacy is a fundamental portion when analyzing the capital strength. The average annual growth rate of GDP is 1.95% from 2017 to 2021 in the United States, with a maximum value of 5.7% and a minimum of -3.4%. The mean inflation rate is 2.46%, and the lending interest rate is 4.22%.

Table.2. Descriptive statistics of variables

	N	Mean	Std.	Min	Max
Size	45	3.003	0.368	2.350	3.570
Lev	45	0.182	0.0948	0.0614	0.424
L-Risk	45	0.618	0.169	0.151	0.817
CAD	45	0.108	0.0194	0.0751	0.149
GDP	45	0.0195	0.0300	-0.0340	0.0570
Inflation	45	0.0246	0.0120	0.0123	0.0470
LII	45	0.0422	0.00784	0.0330	0.0530
ROAA	45	0.0141	0.00562	0.00960	0.0288
ROAE	45	0.140	0.0419	0.0919	0.210

3.2 Analysis of panel regression results

3.2.1. The micro determinants of ROAA and ROAE

The micro determinants of ROAA and ROAE are presented in Table 3. The bank size (logarithm of the total assets) does not influence the nine commercial banks' profitability, both ROAA and ROAE.

The capital adequacy ratio does not significantly impact the shareholders' return; on the contrary, it has a statistically significant impact on the ROAA, which is negative and weak (about 0.16). Banks with higher capital adequacy have lower risk, thus leading to less profit for the shareholders and investors who want to benefit from the risk-taking. The results are consistent with the hypothesis before.

The debt to assets is a kind of leverage ratio, and it affects ROAE with high statistical significance, which is the average return on the shareholders' investment. Its effect on ROAE is negative and robust (about -0.508) and ten times more potent than the effect on ROAA (about -0.043), which is pretty weak. When the leverage ratio increases, the total debts increase, or the total assets decrease. The higher the leverage ratio, the higher risk of the investing in the company and the higher shareholders' return.

The L-risk ratio has a statistically significant impact on both ROAA and ROAE. Liquidity risk is measured as total deposits over total assets, also explained as the deposit ratio. Deposits are one of the essential foundations of the bank, and the more deposits are used as loans, the higher the loan rate and profitability of the bank. Suppose the ratio decreases; for example, the bank uses much of the total deposits to grant many loans to the customers without changing the total assets. In that case, the bank has a better performance. From another perspective, if the total deposit over the total assets is higher, the bank has a lower risk of liquidity risk because they can make payments as scheduled, the higher ROAA and ROAE the bank has. Liquidity risk has a negative and pretty substantial impact on the ROAE (about -0.42) and a negative and weak impact on ROAA (about 0-.036), but they are all statistically significant.

3.2.2. The macro determinants of ROAA and ROAE

The macro factors are also analyzed, and the results are displayed in Table 3. The growth rate of GDP, inflation rate, and lending interest rate do not influence the performance of the top US commercial banks. It is probably because the bank and the investors could not predict the macro data accurately, and these three factors can be explained as controls in this experiment. However, we can see that GDP has an adverse effect on ROAA and ROAE because the coefficient is a negative number.

Inflation and lending interest rate positively influence ROAA and ROAE to some extent according to the data. Additionally, their relationship with ROAE is much higher than the relationship with ROAA. Generally, macro determinants analyzed in the research do not have a statistically significant impact on the profitability of banks.

Table.3. Regression results

	ROAA	t-statistics	ROAE	t-statistics
Size	-0.002	-0.96	-0.020	-1.14
Lev	-0.043	-1.62	-0.508***	-3.13
L-Risk	-0.036**	-2.67	-0.420***	-5.37
CAD	0.162**	2.09	-0.092	-0.16
GDP	-0.088	-0.82	-0.298	-0.38
Inflation	0.261	0.89	0.824	0.38
LII	0.097	0.39	0.697	0.41
Constant	0.024	1.17	0.519***	3.30
Observations	45		45	
R-squared	0.423		0.434	

Notes: *** p<0.01, ** p<0.05, * p<0.1.

3.2.3. Further discussions

We may infer that the actual study results are primarily compatible with the predicted outcomes after evaluating the determinants of bank profitability of the nine largest US commercial banks. The leverage ratio, liquidity risk, and capital adequacy influence banks' profitability. Liquidity risk influences ROAA and ROAE, leverage ratio has an influence on ROAE, and capital adequacy has an influence on ROAA. The size of the bank does not matter a lot for the profitability of commercial banks, just a weak relationship. The GDP, inflation, and interest rate can be regarded as the controls from our regression model. They did not matter a lot for the profitability of the top US commercial banks.

Nevertheless, the inflation rate and the lending interest rate positively impact profitability. For the recommendation for the banks, it is better for them to closely monitor the leverage ratio, capital adequacy, and liquidity risk. The liquidity risk management is essential for commercial banks because the liquidity risk has a statically significant impact on both ROAA and ROAE. Proper liquidity risk management can boost the ability to maintain a healthy environment for commercial banks to avoid insolvency and bankruptcy. It is better to attract more deposits to the bank to fill banks' losses.

4. Conclusions

The research topic is the macro and micro factors of commercial banks' profitability in the United States from 2017 to 2021. The study collected the data from the nine commercial banks, including JPMorgan Chase, Wells Fargo Bank, Citi Bank, Bank of America, U.S. Bank, Truist Bank, PNC Bank, Capital One, and Goldman Sachs. The research used the panel regression method to analyze the collected data. After analyzing the data, the research found that the liquidity risk is a micro factor that influenced the profitability, both on ROAA and ROAE. The leverage ratio also influenced the profitability, only on ROAE. Capital adequacy influenced the profitability only on ROAA. The macro factors do not influence the profitability of the research. The findings suggest that liquidity risk management is critical for a commercial bank and managing the risk is necessary. The top commercial banks are influenced mainly by macro factors. The micro factors do not influence the profitability of these nine US commercial banks from 2017 to 2021. For the study's limitations, the research just adopted the statistics of the nine largest US commercial banks, and the sample of the data is small. It is better to amplify the sample size to generalize the results.

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