



The Impact of Capital Structure on Profitability

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Abstract. This study examines the relationship between the capital structure and profitability of Chinese banks. This paper collects data from the Chinese banking sector from 2008 to 2021 for analysis. The findings are that the debt-to-asset ratio negatively impacts bank profitability across the entire banking industry. The empirical analysis remains robust when using fixed effects. To address the issue of heterogeneity, this paper considers the impact of the debt-to-asset ratio on bank profitability under different capital turnover rates. Findings are that the impact of debt-to-asset ratio on bank profitability varies in different groups.

Keywords: Commercial Bank, Capital structure, Liability, Profitability.

1 Introduction

Banks are institutions of credit, operating primarily on a liability-based model. The core of this liability-based operation is that by absorbing deposits and other forms of liabilities, commercial banks can expand their available capital. The expansion of capital enables banks to issue more loans and investments, thereby increasing opportunities and potential for profit. For instance, banks can use the absorbed deposits to issue loans, earning interest margins, or to make investments for returns.

However, an increase in liabilities also brings greater financial pressure and risk. Firstly, high liabilities mean that banks must pay more interest to depositors and other creditors, inevitably increasing operating costs. Secondly, a high debt ratio reduces the capital buffer, making banks more vulnerable to liquidity and default risks during economic fluctuations or financial crises.

Therefore, the debt ratio of commercial banks has a dual impact on their operations. On one hand, high liabilities can lead to higher profitability; on the other hand, they also increase financial risk and uncertainty. The academic community has yet to reach a consensus on which effect dominates in practice. Different research findings and real-world cases show that the impact of a bank's liability structure on profitability is complex and variable.

To resolve this debate, this paper focuses on the impact of liability structure on the profitability of commercial banks. Specifically, through empirical analysis and case studies, it explores how bank profitability varies under different liability structures and which factors play key roles in this process. Additionally, it combines macroeconomic conditions, regulatory policies, and internal bank management to comprehensively

analyze the overall impact of liability structure on commercial banks. This study aims to provide theoretical support and practical recommendations for liability management and profitability enhancement in commercial banks.

2 Literature Review

Bank profitability measures a bank's ability to generate profit through its core business activities over a certain period. Bank profitability is crucial for its continuous operation, shareholder returns, and market competitiveness. It is a multi-dimensional concept influenced by various internal and external factors. Banks must manage their core businesses well while focusing on risk control, operational efficiency, and market changes to achieve sustainable profit growth. ^[6]Kjosevski (2024) believes that bank profitability plays a crucial role in financial stability and economic growth. It allows banks to accumulate capital through retained earnings, which in turn helps build a strong buffer to absorb unexpected losses. This, in turn, helps mitigate negative impacts on the real economy rather than exacerbating them.

The academic community typically uses several different metrics to measure bank profitability. ^[1]In current literature, bank profitability is usually measured by net interest margin (NIM), return on average assets (ROA), and return on average equity (ROE) (Battern & Vo, 2019). ^[1]Battern & Vo (2019) suggest that NIM focuses on measuring the profitability of interest activities, ROA reflects the ability of bank management to generate income and profit from assets, and ROE measures shareholder returns.

^[4]Several key factors influence bank profitability. Keka & Ahmeti & Aliu (2023) argue that the number of employees, loan interest rates, loan default rates, and total loan amounts significantly impact bank profitability. ^[3]Gabeshi (2021) found that ROE, as a determinant of bank profitability, has a statistically significant relationship with factors such as the ratio of bank credit to the private sector to GDP, real interest rates, and inflation rates, suggesting that an increase in any of these factors leads to higher bank profitability. ^[12]Zohra.K & Abbassia & Zohra.D (2022) discussed the impact of net profit, total revenue, and return on net assets on bank profitability in their article. Their study shows that net profit, total revenue, and return on net assets significantly influence banks. This paper discusses the impact of liability structure on profitability.

The liability structure of a bank refers to the composition and proportion of different sources of liabilities during the financing process. Liability-based operation refers to the model where banks obtain funds by absorbing liabilities (such as deposits, loans, etc.) and use these funds for loans and investments to achieve profitability. Managing liabilities is a crucial task for banks. In many cases, the profitability, liquidity, and safety of commercial banks depend significantly on the asset and liability management strategies chosen by the bank (Lileikienė, 2008) ^[7]. ^[7]Lileikienė (2008) describes three strategies in asset-liability management: zero, positive, and negative NII (Net Interest Income). He suggests that the larger the absolute value of NII, the greater the change in net interest income during the analysis period. If a bank chooses an asset-liability management strategy model guided by negative NII, the economic cycle narrows,

interest rates decrease, and the proportion of interest-sensitive liabilities in total time decreases, ensuring liquidity with minimal risk.

Liability-based operation is a primary means for banks to obtain funds and achieve positive profitability. The liability structure of a bank has a significant impact on its operational efficiency and profitability, especially in China, where banks dominate the financial system (Ye Zhang & Dong 2019)^[11].^[5]Jobst (2016) argue that "it is necessary to decisively advance the work of cleaning up the balance sheet, including reducing costs and improving efficiency." and "Many banks should become more profitable, but their lending capacity depends on the size of their capital buffer."^[2]Brick (2014) considers liability management an important part of asset management in banks, contributing to profitability and liquidity generation.^[9]Owusu & Alhassan (2021) found in their study that in Ghana, profitability is related to balance sheet items because most asset and liability components have statistical significance when regressed on two income indicators. At the same time, domestic banks in Ghana have higher returns on assets than foreign banks, and domestic banks also have higher liability costs than foreign banks.^[8]Mustafa (2024) argues that non-performing loans have a significant negative correlation with return on equity and return on assets.

3 Empirical Analysis of the Impact of Bank Asset Structure on Profitability

3.1 Variables and Definitions

This paper uses bank profitability as the dependent variable, the debt-to-asset ratio as the core explanatory variable, and competition, scale of bank, income of money supply, asset turnover, salary and employee as control variables, as shown in Table 1. This paper constructs a panel regression model with clear symbol definitions and variable explanations. The specific definitions and explanations are as follows:

Table 1. variables and definitions

Variables	Name	Sym- bol	Definition
Variable being explained	profitability	(ROA)	return on assets
Core explained variable	asset-liability ratio	ZF	Liability/asset
	Competition	WIN	The proportion of bank's income to the whole income in the industry
Control Variables	scale of bank	SIZE	The logarithm of a bank's total assets
	Expense	M2	The growth rate of money supply
	asset turnover	ATR	Operating income/Average total assets
	salary	PCS	The logarithm of the pay per employee of a bank
	employee	WR	The logarithm of number of employees

Establishment of the Empirical Model.

There are many empirical models to study the relationship between variables but this paper constructs a panel regression model to conduct an empirical analysis of the factors influencing the impact of corporate R&D on operational performance. It considers individual effects, time effects, robustness analysis, heterogeneity analysis, and endogenous processing, leading to regression conclusions and economic significance. The specific model construction is as follows:

$$ROA_{it} = \beta_0 + \beta_1 ZF_{it} + \sum m_j X_{jit} + Q_i + S_t + u_{it} \quad (1)$$

Where β_0 represents the intercept, β_i represents the coefficients of various variables, ROA is profitability as the dependent variable, ZF is the debt-to-asset ratio as the core explanatory variable and X denotes control variables.

3.2 Data Sources and Descriptive Statistics of Variables

To thoroughly study the factors influencing the impact of the debt-to-asset ratio on bank profitability and considering the availability of data, this paper selects 59 banks from 2008 to 2021 as the research objects. The data were manually compiled from the annual reports and Wind database as shown in Table 2. Through empirical research on the data, this paper investigates the impact of the debt-to-asset ratio on bank profitability. And the statistics description is as follows.

Table 2. statistics description table

statistical magnitude	OB	AVG	SD	MIN	MAX
ROA	793	1.0120	0.2923	0.5472	1.6338
ZF	796	92.9186	1.7884	76.4752	101.3128
WIN	789	0.5925	0.0415	0.5119	0.6784
ATR	778	1.4682	1.45589	0.2354	2.8442
SIZE	799	26.5896	1.8580	20.9828	31.0406
M2	826	0.09151	0.0782	0.0514	0.1468
WR	575	9.0884	1.6387	5.9989	13.1285
PCS	567	12.6843	0.3123	11.5944	13.7880

3.3 Basic Empirical Analysis of the Impact of the Debt-to-Asset Ratio on Bank Profitability

Based on the steps of empirical analysis, the regression results are shown in table 3. According to the regression results, the goodness of fit for the mixed cross-sectional model is acceptable, and the goodness of fit meets the requirements. And the regression result shows that the impacts of debt-to-asset on bank profitability in different results are significantly negative at the 1% significance level.

Table 3. Regression result table

	General multiple re- gression model	Individual fixed effect model	Individual year dual fixed effect model
ZF	-0.0581*** (0.0070)	-0.0532*** (0.0084)	-0.0484*** (0.0075)
WIN	1.6036*** (0.2306)	1.5336*** (0.2874)	0.1151 (0.3125)
ATR	-0.1817*** (0.0146)	-1.1723*** (0.0150)	-1.1216*** (0.0162)
SIZE	-0.1615*** (0.0315)	-2.171*** (0.0626)	-.0332 (0.0573)
M2	-0.2291*** (0.0250)	-2.686*** (0.0664)	-2.984*** (0.0611)
WR	0.1905*** (0.0311)	.2790*** (0.0513)	.0954** (0.0478)
PCS	0.1135*** (0.0400)	.2572*** (0.0551)	.0095 (.0533)
C	10.14*** (0.8272)	9.1625*** (.9052)	9.6300*** (.8467)
Adj.R ²	0.5086	0.5177	0.6396
F/W	84.25	76.51	45.49
Prob(F- stat)	0.0000	0.0000	0.0000
N	564	564	564
Individual Fixed	N	Y	Y
Year Fixed	N	N	Y

3.4 Heterogeneity Analysis

The capital turnover rate is an important indicator of a bank's financial health. It affects not only the bank's profitability and operational efficiency but also closely relates to risk management and capital utilization. The regression results in different capital turnover groups are shown in Table 4.

Table 4. heterogeneity result

	High Capital Turnover	Low Capital Turnover
ZF	-.0429*** (.0118)	-.0525*** (.0104)
WIN	.7849* (.4494)	.2040 (.4662)
ATR	-.2193*** (.0249)	-.1216** (.0448)
SIZE	-.2742**	.1236

	High Capital Turnover	Low Capital Turnover
	(.0908)	(.0790)
M2	-.3161***	.1236***
	(.0868)	(.0790)
WR	.4062***	.0076
	(.0815)	(.0613)
PCS	-.2513**	-.0500
	(.0945)	(.0631)
C	9.7700***	8.5688***
	(9.7700)	(1.2243)
Adj.R ²	0.6581	0.6340
F/W	20.16	20.33
Prob(F-stat)	0.0000	0.0000
N	273	287
Individual Fixed	Y	Y
Year Fixed	Y	Y

According to the regression results in table 4, the impact of the debt-to-asset ratio on bank profitability is greater in low capital turnover rate banks than in high capital turnover rate banks. The results show that the impact coefficient of the debt-to-asset ratio on bank profitability is -0.0525 for low capital turnover rate banks, which is significant at the 1% level. However, the impact of the debt-to-asset ratio on profitability in high capital turnover rate banks is not significant. This regression result aligns with reality. When the capital turnover rate is high, banks typically have better operating conditions and higher operational efficiency, reducing the impact of the debt-to-asset ratio. Conversely, banks with a lower capital turnover rate have poorer operating conditions and lower operational efficiency, making the debt-to-asset ratio have a more significant impact on profitability.

4 Conclusion

This paper conducts regression analysis on the impact of bank asset structure on profitability. By using the debt-to-asset ratio as the core variable and ROA as the dependent variable, along with competition winsor, capital turnover ratio, assets, annual billion, employee numbers, and average employee compensation as control variables, mixed cross-sectional model regression is performed. Based on the mixed cross-sectional model, individual fixed effects models and individual time double fixed effects models are used for regression. All three models show a negative relationship between the debt-to-asset ratio and bank profitability, but the effect is not significant. This also aligns with Perčević's (2023) study^[10]. He studied the relationship between financial assets and liabilities and the total assets of Croatian banks. ^[10]Perčević (2023) found a weak negative correlation between financial liabilities and total bank assets and return on assets (ROA).

Moreover, heterogeneity analysis was conducted based on employee compensation and capital turnover ratio. The study shows that the impact of the debt-to-asset ratio on

bank profitability is more significant in banks with lower employee compensation and lower capital turnover ratios.

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