

Study on the Impact of Net Interest Margin on Income Diversification of A-Share Listed Commercial Banks

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Abstract. This paper, based on quarterly data from listed commercial banks in China, constructs a two-way fixed-effects panel model to analyze the impact of quarterly net interest margin on income structure diversification. Sub-sample analyses are conducted for state-owned banks, joint-stock banks, urban banks, and banks of different sizes. The results show that a decline in NIM significantly promotes income structure diversification, prompting banks to increase non-interest income such as fees, commissions, and investment income to cope with the pressure of reduced interest income. The responses to this vary among different types of banks, with state-owned banks showing more significant diversification effects, while joint-stock banks exhibit weaker effects.

Keywords: listed commercial banks; quarterly data; two-way fixed-effects panel model; net interest margin ; income structure diversification.

1. Introduction

There is currently limited literature directly studying the impact of commercial banks' net interest margin on income structure diversification, and most of the existing studies that analyze bank diversification use annual data, lacking research based on quarterly data, and focus on earlier time periods. This paper manually calculates the quarterly NIM of banks and investigates the impact of quarterly NIM on quarterly income structure diversification using recent quarterly data. Quarterly data provides more refined temporal analysis, allowing researchers to capture NIM fluctuations across different quarters. This level of detail is beneficial for analyzing the performance of NIM under seasonal or cyclical changes, thus providing a better understanding of its impact on income structure. Studying the impact of NIM on income diversification not only enhances the understanding of banking operations but also contributes to the development of related academic fields. Continuous academic exploration and empirical research can enrich the theoretical framework of finance and banking and provide a foundation and inspiration for future research.

2. Literature review

The According to current research results from both domestic and international scholars, there is relatively little literature directly studying the impact of bank net interest margin (NIM) on income structure diversification. Baele (2007)[1] and Laeven and Levine (2007)[2] found that banks oriented toward non-traditional banking activities tend to have higher non-interest income. Lin, Chung, and Hsieh (2012)[3] extended Angbazo's (1997)[4] model and included bank diversification as part of their study, finding that in the case of Asian commercial banks, NIM fluctuations bring risks, but banks with more diversified operations are better able to withstand these risks. Nguyen (2012)[5], using a system estimation method, studied the relationship between NIM and non-interest income for 3,593 commercial banks across 44 financial liberalization countries from 1997 to 2004. He found that during the sub-period from 1997 to 2002, there was a significant negative correlation between NIM and non-interest income. However, during the subsequent period from 2003 to 2004, the relationship was generally positive but not statistically significant. Ammar and Boughrara (2019)[6] found that NIM is an important factor in the diversification strategy decisions of non-Gulf banks. Angori, Aristei, and Gallo (2019)[7] analyzed the NIM of Eurozone banks from 2008 to 2014 and found that the



declining profit margins of traditional banking activities made sustainable profitability difficult to achieve and increased the vulnerability of the European banking system, leading to the expansion of non-traditional activities to balance this effect.

3. Empirical model and data

3.1. Model setting

This paper uses panel data from A-share listed commercial banks from Q1 2019 to Q2 2023. Regression analysis is conducted in Stata 17.0, employing a two-way fixed-effects model to examine the impact of net interest margin on income diversification. The model controls for individual and time effects, focusing on NIM and control variables to assess their influence on the income diversification index.

$$\begin{aligned} \text{DIV}_{i,t} = & \alpha_i + \tau_t + \beta_0 + \beta_1 \text{NIM}_{i,t} + \beta_2 \text{CDR}_{i,t} + \beta_3 \text{DLR}_{i,t} + \beta_4 \text{DAR}_{i,t} + \beta_5 \text{CIR}_{i,t} + \\ & \beta_6 \ln(\text{GDP})_{i,t} + \beta_7 \ln(\text{LANP})_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Here, i takes values 1, 2, ... N, representing the individual identifiers of sample commercial banks, and t takes values 1, 2, ... T, representing time. α_i denotes the fixed effect of the i -th individual, τ_t represents the time fixed effect, and $\varepsilon_{i,t}$ is the random disturbance term that includes unexplained factors.

3.2. variable measurement and data source

3.2.1. Dependent variable

As the dependent variable, the income diversification index is calculated by taking the proportion of each type of income (e.g., interest, fees, investment income, etc.) in total operating income, squaring these proportions, and summing them to produce an indicator reflecting income concentration. The closer the result is to 1, the more the bank may be overly reliant on a particular income source, increasing operational risk. Conversely, a result closer to 0 indicates more diversified income sources and lower risk.

3.2.2. Independent variables

Net Interest Margin (NIM): Net interest margin is calculated by dividing net interest income by the average balance of interest-earning assets. The average balance of interest-earning assets used in calculating NIM is determined by taking the mean of the beginning and ending balances of these assets. As an important indicator of a bank's ability to generate interest income from interest-earning assets, a higher NIM indicates a stronger profitability from interest income. An increase in NIM may lead banks to overly rely on interest income, reducing income structure diversification. Conversely, a lower NIM may encourage banks to diversify their income sources, such as by developing non-interest income, thereby enhancing the diversity of their income structure.

3.2.3. Control variables

Control variables include credit default rate, loan-to-deposit ratio, capital adequacy ratio, cost-to-income ratio, total loan volume, gross domestic product, bank type, and asset size.

4. Empirical findings

The first to fourth columns in the figure below show the regression results for the full sample and subsamples. Column 1 presents the regression results for the full sample, while columns 2 to 4 represent the regression results for state-owned commercial banks, joint-stock commercial banks, and urban commercial banks, respectively.

Table 1. Regression Results of Net Interest Margin and Bank Income Structure Diversification

	(1)	(2)	(3)	(4)
	DIV	DIV	DIV	DIV
NIM	-9.300*** (-6.50)	-19.035*** (-4.60)	-7.440** (-3.23)	-9.543*** (-4.58)
CDR	-1.108 (-0.36)	2.445 (0.28)	-8.1 (-1.30)	1.174 (0.24)
DLR	-0.322*** (-2.82)	-0.351 (-0.67)	-0.175 (-0.85)	-0.395** (-3.08)
DAR	-0.483 (-1.61)	-2.112 (-2.49)	-0.526 (-0.73)	-0.221 (-0.61)
CIR	-0.433*** (-4.32)	-0.557*** (-6.74)	-0.271** (-3.41)	-0.366** (-2.55)
ln(GDP)	-0.097 (-0.85)	0.571 (0.75)	-0.147 (-0.48)	-0.073 (-0.33)
LANP	-0.008 (-0.13)	-0.676 (-1.23)	-0.019 (-0.11)	0.041 (0.46)
_cons	2.381* (2.47)	2.379 (0.68)	3.094 (1.32)	1.615 (0.76)
Sample Size	522	90	162	270
Adjusted R ²	0.536	0.876	0.701	0.517
Individual Effects	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In the full sample, the regression coefficient of NIM on income diversification (DIV) is -9.300, significant at the 1% level, showing that as NIM declines, banks increasingly turn to non-interest income to balance revenue. State-owned banks show a stronger effect (coefficient -19.035, 1% significance), as they expand non-interest income, particularly in wealth management and investment banking, to counter margin pressures. Joint-stock banks also respond to NIM declines, though with less intensity, while urban banks face greater pressure to diversify income due to regional limitations.

The cost-to-income ratio (CIR) negatively impacts DIV across all bank types, with the effect most pronounced in state-owned banks, where lower CIR facilitates non-interest income expansion. The loan-to-deposit ratio (DLR) also significantly restricts diversification in the full sample, especially for urban banks, which face liquidity constraints in local markets.

5. Summary

This paper uses data from 29 listed Chinese commercial banks (Q1 2019 - Q2 2023) to examine how net interest margin (NIM) impacts income diversification (DIV) through a two-way fixed-effects

panel model, with subsample analysis for different bank types (state-owned, joint-stock, urban, large, medium, and small banks). The key findings are: A significant negative correlation between NIM and income diversification suggests that as NIM declines, banks increasingly rely on non-interest income (e.g., fees, commissions, and investment income) to offset reduced interest income, enhancing revenue diversity and reducing risk exposure. This effect is most pronounced in state-owned and urban banks, where declining NIM drives them to accelerate non-interest income expansion to stabilize revenue. Joint-stock banks, with generally higher NIM and more diversified income, show a weaker response.

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