Research Article

Commercial Bank Performance and Ownership Concentration: An Empirical Analysis of Commercial Banks from a Global Perspective

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This paper examines the relationship between ownership concentration and bank performance. In order to verify the linear or nonlinear relationship between bank performance and ownership concentration, we select the data of the top 100 commercial banks in the BVD-Bankfocus database for regression analysis. The study found that there is no significant correlation between ownership concentration and bank performance, whether it is linear or nonlinear. Besides it found that the better the economic environment, the better the performance of commercial banks; the higher the leverage ratio, the higher the profitability, and the better the bank performance. It also found there is no correlation between bank performance and bank size.

1. Introduction

As discussed by Iannotta et al. [1], the ownership structure of commercial banks can be determined by two dimensions: one is the ownership concentration; the other is the nature of the owner. There is no significant difference in the nature of owners in the sample relative to ownership concentration, so we consider the relationship between ownership concentration and bank performance in this paper. Most scholars' research the impact of ownership on bank performance, often selecting commercial banks in a certain country or region [2–5], while this paper selects the top 100 commercial banks in the BVD-Bankfocus database, covering Asia, Europe, America, and Oceania.

Scholars have come to different conclusions by selecting samples from different regions and different years. For instance, according to Huang [6], the higher the ownership concentration of the bank, the stronger the bank's profitability. Ozili and Uadiale [7] found similar conclusions, with concentrated ownership of banks having higher returns on assets, higher net interest margins, and higher recurring

earning power. On the contrary, there is evidence found by Riewsathirathorn et al. [8] that more concentrated ownership is linked to poorer bank performance. In addition, the view that ownership concentration has a nonlinear relationship with bank performance has also been proposed, including u-shaped correlation [9] and cubic relationship [10]. Finally, unlike the above findings, Wen [11] and Zouari and Taktak [12] found that there is no correlation between ownership concentration and bank performance. Based on the above-given situation, what this paper does is to build models to verify the relationship between ownership concentration and bank performance: linear, u-shaped, or cubic relationship.

Previous studies have used a large number of performance indicators to measure bank performance. Return on assets (ROAs), return on equity (ROE), and net interest margin (NIM) are the most commonly used measures of performance in literature [13, 14]. According to Berger et al. [15], performance is measured in terms of efficiency levels and profit efficiency levels. In addition, to measure performance more comprehensively, there are several multiple

indicator systems to measure bank performance. For instance, indicators used by Brean [16] include ROA, ROE, the cost/income ratio, the nonperforming asset ratio, the capital adequacy ratio, and the nonperforming loan provision coverage ratio. Based on Brean, according to the characteristics of the indicators, Boateng et al. [2] are replaced indicators by four indices, namely, performance index, the asset quality index, the profitability index, and the liquidity index. In this context, this paper classifies indicators by profitability, liquidity, safety, and growth of commercial banks, constructs a bank performance indicator system, and explores the relationship between bank performance and ownership concentration based on this system. Contrary to the conclusions of most scholars, our findings show that there is no significant correlation between bank performance and ownership concentration.

2. Materials and Methods

2.1. Our Sample. The data used in this paper are balanced panel data. Select the top 100 commercial banks in the global total assets of the BVD-Bankfocus database and exclude 13 banks with incomplete data. Finally, the entire sample contains the data of 87 banks from 2016 to 2020, and a total of 435 observations are generated. Most of the data about the performance and Ownership concentration of each bank in the sample comes from the BVD-Bankfocus database, and some missing data can be filled by searching the annual report of the corresponding year.

2.2. Empirical Model. To examine the linear effect of ownership concentration on bank performance, we start with a fixed-effects model with heteroskedasticity and robust standard errors:

$$PER_{it} = \alpha_1 + \beta_1 SR_{it} + \lambda_1 \text{Controls}_{it} + \mu_i + \tau_t + \varepsilon_{it}, \qquad (1)$$

where the dependent variable PER_{it} represents a performance indicator that we developed based on 10 independent bank performance variables; SR_{it} is used to indicate the meaning of ownership concentration, it is the abbreviation of shareholding Ratio, indicating the shareholding ratio of the top shareholders; Controls_{it} represents all control variables; μ_i denote the unobserved bank-fixed effects, τ_t denote the unobserved year-fixed effects and ε_{it} is the error term.

Based on (1), consider the U-shaped effect of ownership concentration on performance. The model is as follows:

$$PER_{it} = \alpha_2 + \beta_2 SR_{it} + \beta_3 Hfdl_{it} + \lambda_2 \text{Controls}_{it} + \mu_i + \tau_t + \varepsilon_{it}, \qquad (2)$$

where $Hf\ dl_{it}$ is a variable representing the U-shaped effect of ownership concentration on bank performance [14, 17].

To explore the cubic relationship between banking and performance and ownership concentration, the following model is established:

$$PER_{it} = \alpha_3 + \beta_4 SR_{it} + \beta_5 Hf\ dl_{it} + \beta_6 SR_{it}^3 + \lambda_3 \text{Controls}_{it} + \mu_i + \tau_t + \varepsilon_{it}, \qquad (3)$$

2.3. Measurement of Variables

2.3.1. Dependent Variables. The dependent variable PER_{it} in formula (3) is based on 10 performance indicators selected based on the bank's profitability, liquidity, security, and growth, namely, return on average assets, return on average equity, cost to income ratio, net loans/total assets, liquid assets/deposit and short-term funding, tier ratio, nonperforming loans/gross loans, loan loss reserve/nonperforming loans, total asset growth rate, and gross loan growth rate. Table 1 shows the system of bank performance indicators. Using principal component analysis, the ten indicators of the appeal were reduced in dimension, and the performance score was calculated according to the variance contribution rate (see Appendix A).

2.3.2. Explanatory Variables. The ownership concentration includes two types of variables: one is the SR index, which uses SR1, SR5, and SR10 to represent the sum of the shareholding ratios of the top 1, top 5, and top 10 shareholders, respectively; the other is the Herfindahl index, which uses Hfdl1, Hfdl5 and Hfdl10 represent the square sum of the shareholding ratio of the top 1, top 5, and top 10 shareholders, respectively.

2.3.3. Control Variables. As discussed by Zhou and Wong [18], banks with larger assets are less profitable because of narrow interest margins. Besides, according to Huang [6], the association between ownership concentration and bank profitability is negatively moderated by bank size. Therefore, we take the logarithm of the bank size (total assets) as the control variable. Different banks may pursue different goals, according to Nutt [19], state-owned banks may pursue social and political goals compared to other banks' goal of maximizing shareholder wealth, in order to eliminate this effect, we take the log of bank net income as the control variable. There is often a correlation between bank leverage and profitability; Abreu and Mendes [20] found that high profitability of banks is often accompanied by low leverage, we, therefore, control the effects of the capital structure measured as equity/total assets. Taking into account the impact of macroeconomics on bank performance, the GDP growth rate of the country to which the commercial bank belongs is used as a control variable.

3. Results and Discussion

3.1. Descriptive Statistics. Table 2 reports the descriptive statistics. Under the performance indicator system we constructed, the average value of performance is −6.098, the minimum value is −21.00, the maximum value is 31.69, and the variance is 6.206. It shows that the performance level of the sample commercial banks is quite different. The SR index and the Hfdl index show that there is a great difference in the ownership concentration among the sample commercial banks. In addition, we found that the average value of the growth rate of GDP was 1.639%, and the variance was 3.731, indicating that the global economic macro environment was

TABLE 1: Commercial bank performance evaluation indicator system.

Primary indicator	Secondary indicators
Profitability indicator	Return on average assets (ROAA)
	Return on average equity (ROAE)
	Cost to income ratio (CIR)
Liquidity indicator	Net loans/total assets (NLTA)
	Liquid assets/deposit and short-term funding (LADS)
Security indicators	Tier ratio (TR)
	Nonperforming loans/gross loans (NPL)
	Loan loss reserve/nonperforming loans (LLR)
Growth indicator	Total asset growth rate (TAGR)
	Gross loan growth rate (GLGR)

TABLE 2: Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Per	435	−6.098	6.206	−21.00	31.69
SR1	435	0.271	0.256	0.0310	1
SR5	435	0.495	0.283	0.107	1
SR10	435	0.576	0.263	0.150	1
Hfdl1 (SR1²)	435	0.139	0.238	0.00100	1
Hfdl5	435	0.169	0.243	0.00300	1
Hfdl10	435	0.171	0.242	0.00300	1
SR1³	435	0.0960	0.222	0.00003	1
Log (Bank size)	435	20.23	0.786	18.56	22.35
Log (Net income)	435	13.77	6.012	−16.30	17.70
Equity/total assets	435	7.145	2.222	3.430	15.28
Gdp_gr	435	1.639	3.731	−10.82	8.256

Note. PER is the performance value obtained based on the performance indicator system in Table 1; SR1, SR5, and SR10 represent the sum of the shareholding ratios of the top 1, 5, and 10 shareholders, respectively; Hfdl1, Hfdl5, and Hfdl10 represent the sum of the squares of the shareholding ratios of the top 1, 5, and 10 shareholders, respectively; SR1³ represents the cube of the shareholding ratio of the largest shareholder; Log(Bank size) represents the logarithm of the bank's total assets for the year; Log(Net income) represents the logarithm of the bank's net income for the year; equity/total assets represent the bank's leverage; Gdp_gr represents the GDP growth rate of the country to which the bank belongs in the current year.

acceptable, but it showed great differences in different countries.

3.2. Regression Results. In order to more comprehensively examine the impact of shareholder shareholding ratio, substitute SR1, SR5, and SR10 into (1), respectively, and the obtained regression results are shown in (1-1), (1-2), and (1-3) in Table 3. We find that the linear relationship between bank performance and ownership concentration is not statistically significant. That means our findings are at variance with a number of studies such as Huang [6], Ozili and Uadiale [7], and Riewsathirathorn et al. [8]. Since linear relationships are not statistically significant, what about non-linear relationships?.

In order to verify whether there is a U-shaped relationship between ownership concentration and performance, SR1, Hdfl1, SR5, Hdfl5, and SR10, Hdfl10 are, respectively, substituted into equations (2), (2-1), and (2-2), and (2-3) in Table 3 show the regression results. We also find that the U-shaped relationship between ownership concentration and performance is not statistically significant, which is contrary to Azoury [9].

Finally, to examine the cubic relationship between ownership concentration and performance, (3) in Table 3 shows the regression result of equation (3), which shows that there is no cubic relationship between ownership concentration and performance, that is contrary to Gutiérrez et al. [10].

Taking into account the above-given results, we get results consistent with Wen [11] and Zouari et al. [12], that there is no significant relationship between ownership concentration and bank performance.

For control variables, the results show that bank performance has nothing to do with bank size; bank net income is positively correlated with bank performance, and both are significant at the 1% level, with coefficients ranging from 5.648 to 5.669; equity/total assets are negatively correlated with bank performance, and all are significant at the 5% level, with coefficients ranging from −0.930 to −0.901; GDP growth rate is positively correlated with bank performance, and both are significant at the 5% level, with coefficients ranging from 0.270 to 0.285.

For robustness checks, we use ROAA and ROAE as surrogate measures of bank performance, respectively and rerun the model. The results are summarized in Tables 4 and 5. We

TABLE 3: Impact of ownership concentration on bank performance.

	Linear			U-shape			Cube
	(1-1)	(1-2)	(1–3)	(2-1)	(2-2)	(2-3)	(3)
Variables	PER	PER	PER	PER	PER	PER	PER
SR1	0.366			−12.035			−16.243
	(0.09)			(−0.99)			(−0.62)
SR5		1.749			1.387		
		(0.57)			(0.41)		
SR10			−1.006			−1.642	
			(−0.31)			(−0.48)	
Hfdl1/SR1̄2				11.131			21.109
				(1.18)			(0.43)
Hfdl5					1.102		
					(0.32)		
Hfdl10						2.689	
						(0.77)	
SR1̄3							−6.368
							(−0.24)
Log(Bank size)	5.651	5.649	5.661	5.649	5.648	5.663	5.669
	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)	(0.90)
Log(Net income)	0.117***	0.117***	0.116***	0.114***	0.117***	0.116***	0.113***
	(2.96)	(2.96)	(2.93)	(2.91)	(2.96)	(2.94)	(2.91)
Equity/total assets	−0.912**	−0.930**	−0.904**	−0.901**	−0.928**	−0.903**	−0.906**
	(−2.47)	(−2.50)	(−2.43)	(−2.45)	(−2.48)	(−2.42)	(−2.45)
Gdp_gr	0.279**	0.277**	0.281**	0.270**	0.278**	0.285**	0.271**
	(2.51)	(2.49)	(2.54)	(2.40)	(2.52)	(2.60)	(2.41)
Constant	−117.279	−117.896	−116.837	−115.412	−117.897	−116.980	−115.421
	(−0.92)	(−0.93)	(−0.92)	(−0.91)	(−0.93)	(−0.92)	(−0.91)
Observations	435	435	435	435	435	435	435
R-squared	0.150	0.150	0.150	0.152	0.151	0.151	0.152
Number of bank	87	87	87	87	87	87	87
r2_a	0.132	0.132	0.132	0.132	0.131	0.131	0.130
F	3.719	3.659	4.095	4.162	3.653	4.113	6.008

Note. (1–1), (1–2), and (1–3) show the regression results of equation (1); (2–1), (2–2), and (2–3) show the regression results of equation (2); (3) show the regression results of equation (3). All the models are estimated with the bank- and year-fixed effects and the robust standard errors are clustered at the bank level. *t*-statistics are in parenthesis. *, **, and *** indicate the significance at the 10%, 5%, and 1% levels, respectively.

TABLE 4: Impact of ownership concentration on ROAA.

	Linear			U-shape			Cube
	(1-1)	(1-2)	(1–3)	(2-1)	(2-2)	(2-3)	(3)
Variables	ROAA	ROAA	ROAA	ROAA	ROAA	ROAA	ROAA
SR1	0.256			1.299			1.663
	(1.34)			(1.53)			(0.83)
SR5		−0.103			−0.079		
		(−0.37)			(−0.29)		
SR10			−0.304			−0.310	
			(−1.33)			(−1.34)	
Hfdl1/SR1̄2				−0.937			−1.799
				(−1.42)			(−0.52)
Hfdl5					−0.074		
					(−0.40)		
Hfdl10						0.028	
						(0.11)	
SR1̄3							0.551
							(0.30)
Log(Bank size)	0.171	0.170	0.173	0.171	0.170	0.173	0.169
	(1.04)	(1.04)	(1.08)	(1.04)	(1.04)	(1.08)	(1.02)
Log(Net income)	0.019***	0.019***	0.019***	0.019***	0.019***	0.019***	0.019***
	(5.73)	(5.69)	(5.74)	(5.84)	(5.68)	(5.73)	(5.96)
Equity/total assets	0.052**	0.053**	0.054**	0.051**	0.053**	0.055**	0.052**

TABLE 4: Continued.

	Linear			U-shape			Cube
	(1-1)	(1-2)	(1–3)	(2-1)	(2-2)	(2-3)	(3)
	(2.41)	(2.51)	(2.53)	(2.35)	(2.50)	(2.52)	(2.38)
Gdp_gr	0.002	0.001	0.002	0.003	0.001	0.002	0.002
	(0.23)	(0.18)	(0.27)	(0.32)	(0.17)	(0.27)	(0.30)
Constant	−3.658	−3.519	−3.471	−3.815	−3.519	−3.472	−3.814
	(−1.10)	(−1.07)	(−1.07)	(−1.14)	(−1.06)	(−1.07)	(−1.13)
Observations	435	435	435	435	435	435	435
R-squared	0.405	0.404	0.407	0.407	0.404	0.407	0.407
Number of bank	87	87	87	87	87	87	87
r2_a	0.392	0.392	0.395	0.393	0.390	0.393	0.392
F	15.34	14.67	15.40	14.20	13.89	15.03	12.90

Note. (1-1), (1-2), and (1–3) show the regression results of equation (1); (2-1), (2-2), and (2-3) show the regression results of equation (2); (3) show the regression results of equation (3). All the models are estimated with the bank- and year-fixed effects and the robust standard errors are clustered at the bank level. t-statistics are in parenthesis. *, **, and *** indicate the significance at the 10%, 5%, and 1% levels, respectively.

TABLE 5: Impact of ownership concentration on ROAE.

	Linear			U-shape			Cube
	(1-1)	(1-2)	(1–3)	(2-1)	(2-2)	(2-3)	(3)
Variables	ROAE	ROAE	ROAE	ROAE	ROAE	ROAE	ROAE
SR1	3.193			11.856			10.636
	(1.10)			(0.92)			(0.35)
SR5		−0.142			0.049		
		(−0.04)			(0.01)		
SR10			−3.846			−4.190	
			(−1.17)			(−1.20)	
Hfdl1/SR1²				−7.776			−4.885
				(−0.76)			(−0.09)
Hfdl5					−0.583		
					(−0.20)		
Hfdl10						1.454	
						(0.38)	
SR1³							−1.846
							(−0.06)
Log(Bank size)	3.791	3.779	3.821	3.793	3.779	3.823	3.799
	(1.31)	(1.31)	(1.34)	(1.31)	(1.31)	(1.34)	(1.31)
Log(Net income)	0.345***	0.344***	0.342***	0.347***	0.344***	0.342***	0.347***
	(6.16)	(6.12)	(6.13)	(6.24)	(6.11)	(6.13)	(6.36)
Equity/total assets	−0.295	−0.298	−0.266	−0.303	−0.299	−0.266	−0.304
	(−0.83)	(−0.84)	(−0.75)	(−0.84)	(−0.85)	(−0.74)	(−0.86)
Gdp_gr	0.061	0.055	0.065	0.068	0.054	0.067	0.068
	(0.44)	(0.39)	(0.46)	(0.48)	(0.39)	(0.48)	(0.48)
Constant	−73.927	−72.680	−71.571	−75.231	−72.680	−71.649	−75.234
	(−1.27)	(−1.25)	(−1.24)	(−1.28)	(−1.25)	(−1.24)	(−1.28)
Observations	435	435	435	435	435	435	435
R-squared	0.429	0.429	0.431	0.430	0.429	0.431	0.430
Number of bank	87	87	87	87	87	87	87
r2_a	0.417	0.416	0.419	0.416	0.415	0.418	0.415
F	21.25	20.64	23.09	19.35	19.47	22.31	17.87

Note. (1-1), (1-2), and (1–3) show the regression results of equation (1); (2-1), (2-2), and (2-3) show the regression results of equation (2); (3) show the regression results of equation (3). All the models are estimated with the bank- and year-fixed effects and the robust standard errors are clustered at the bank level. t-statistics are in parenthesis. *, **, and *** indicate the significance at the 10%, 5%, and 1% levels, respectively.

TABLE 6: KMO and Bartlett's Test results.

Kaiser–Meyer–Olkin statistic test		0.667
Bartlett's test of sphericity	Approx. Chi-square	1914.719
	Df	45
	Sig.	0.000

TABLE 7: Total variance explained.

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sum of squared loadings		
	Total	% Of variance	Cumulative %	Total	% Of variance	Cumulative %	Total	% Of variance	Cumulative %
1	3.452	34.517	34.517	3.452	34.517	34.517	2.480	24.803	24.803
2	1.540	15.398	49.915	1.540	15.398	49.915	1.665	16.651	41.454
3	1.393	13.929	63.844	1.393	13.929	63.844	1.624	16.238	57.691
4	1.122	11.221	75.065	1.122	11.221	75.065	1.607	16.074	73.766
5	1.015	10.152	85.217	1.015	10.152	85.217	1.145	11.451	85.217
6	0.488	4.883	90.100						
7	0.340	3.403	93.503						
8	0.291	2.907	96.410						
9	0.240	2.402	98.812						
10	0.119	1.188	100.000						

TABLE 8: Component score coefficient matrix.

	F1	F2	F3	F4	F5
ROAA	0.936	0.077	−0.125	−0.060	−0.017
ROAE	0.947	0.069	−0.032	−0.010	−0.004
CIR	−0.719	−0.145	0.159	0.395	0.186
NLTA	0.053	0.034	−0.929	0.066	−0.028
LADS	−0.260	−0.018	0.746	0.425	0.146
TR	−0.010	−0.021	0.223	0.839	−0.210
NPL	−0.056	−0.070	0.115	−0.014	0.947
LLR	0.308	0.139	0.175	−0.721	−0.377
TAGR	0.083	0.923	0.140	0.052	−0.045
GLGR	0.124	0.869	−0.222	−0.191	−0.060

find that ownership concentration is not related to ROAA or ROAE nor is it related to bank size. This result verifies the feasibility of our constructed bank performance indicator system, and at the same time validates our regression results.

4. Conclusions

According to Earle et al. [21], the effect of ownership concentration on firm performance is "complex in theory and ambiguous in experience." This paper studies the relationship between the Ownership concentration and bank performance of 87 commercial banks around the world from 2016 to 2020. The sample commercial banks come from many countries around the world, covering Asia, Europe, North America, South America, and Oceania.

Our results indicate that the Ownership concentration and performance of commercial banks show the characteristics of irrelevance. At the macro level, we found that the better the economic environment, the better the performance of commercial banks; at the corporate level, we found that the higher the leverage ratio, the higher the profitability, and the better the bank performance. We also find there is no correlation between bank performance and bank size.

Appendix

A. Calculation of Bank Performance Value

According to the commercial bank performance evaluation indicator system constructed in Table 1, the Bartlett sphericity test and KMO test are carried out, and the test results are shown in Table 6. It can be seen that the chi-square statistic of the Bartlett sphericity test is 1914.719, the P value is 0.000, and the KMO statistic test value is 0.667, indicating that the evaluation system indicators are significantly correlated and suitable for factor analysis.

Using the principal component analysis method, extracting common factors, reducing the dimensionality of 10 indicators to propose 5 common factors, which can explain 85.217% of the financial indicators in total and can replace the original 10 indicators. The variance decomposition table is shown in Table 7. Then, the maximum variance method is used to rotate the factors and get the factor loading matrix in order of size, as shown in Table 8. Finally, using the variance contribution rate as the weight of each factor, the following formula is obtained to calculate the commercial bank performance score:

$$PER = \frac{F1 * 24.803 + F2 * 16.651 + F3 * 16.238 + F4 * 16.074 + F5 * 11.451}{85.217}. \tag{A.1}$$

Data Availability

The authors confirm that the data supporting the findings of this study are available within the article.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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