



**15TH NATIONAL
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03-05 OCTOBER 2022



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Measures of Bank Competition and Bank Risk-Taking

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Banking and Finance Session

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1. What motivates the study?

- Bank competition can improve allocative, productive, and dynamic efficiencies through innovation, with the ultimate benefit being stronger economic growth
- Central banks are compelled to provide a level-playing field for banks by ensuring that policies are fair to both big and small banks
- Central banks are responsible for ensuring stability of individual banks and the banking system
- Impact of bank competition on stability focus on “competition stability” and “competition-fragility” nexus
- Useful to revisit impact on bank risk-taking and stability following changing competitive dynamics after the global financial crisis



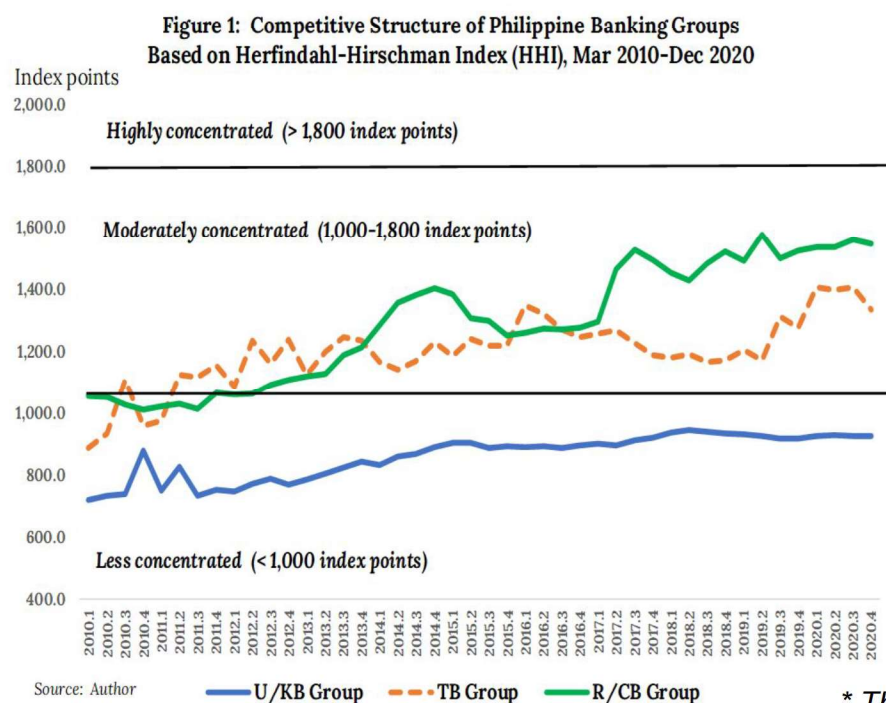
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1. PH banking groups not highly concentrated (1-2)



- HHI * as first approximation of market concentration across banking groups
- TB and R/CB industries (7.2% of banking sector's total assets) are moderately concentrated
- U/KB industry (92.8% of sector's assets) is less concentrated
- Decline in HHIs of TB and R/CB industries (2015 to 2017) due to larger banks able to establish branches in markets previously only served by UKBs
- Gradual rise in HHI after 2008 could be due to post-GFC consolidation

* The HHI is calculated by summing the square of the share of assets for each bank with the group total assets



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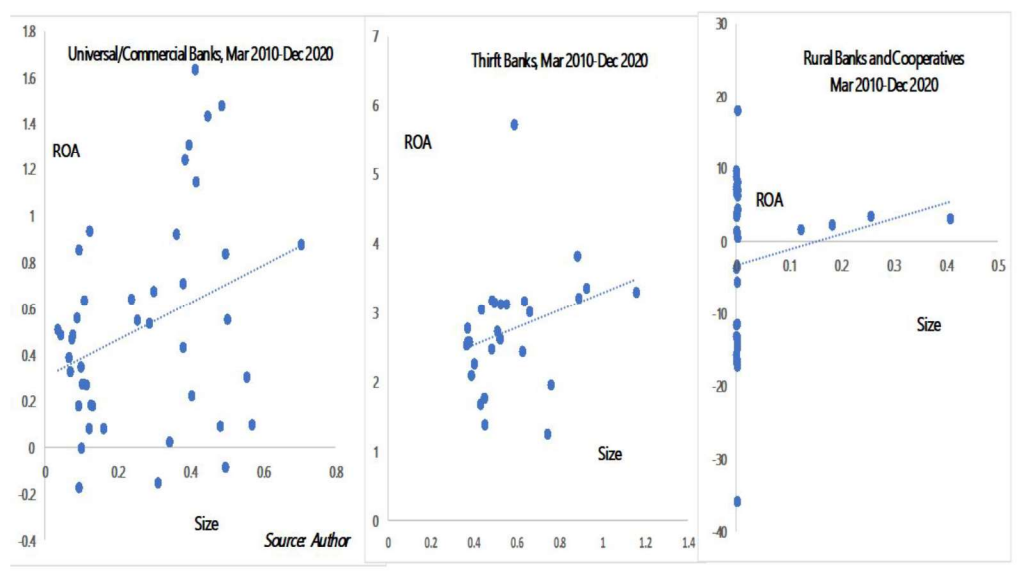
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1. PH banking groups not highly concentrated (2-2)

Figure 2: Bank-level Market Concentration and Return on Assets
March 2010–December 2020



- ROA generally increasing with HHI, albeit there are R/CBs with negative ROAs
- Due mainly to higher degree of diversification among U/KBs
- Banks are generally stable following big mergers and consolidation and higher market concentration



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2. Research questions

- Does competition reduce bank risk?
- Does the relationship between changes in competition and bank risk differ across banking groups?
- Does the impact of the pandemic on bank risk matter?

3. What this paper does

- Examine relationship between measures of bank competition and bank-level risk-taking of 542 Philippine banks from Mar 2010 to Dec 2020 (de-Ramon and Straughan 2020)
 - Bank competition is defined as industry-wide competition
 - Impact of changes in regulatory policies and financial reforms
 - Impact of Covid-19 pandemic on bank solvency risk
- Construct unique bank-level database from Mar 2010 to Dec 2020
 - Measures of bank competition using market concentration in asset market and market power across banking groups
 - Detailed income statements and bank-specific characteristics - Financial Reporting Package
 - Monetary, financial market and real sector indicators

Measures of Bank Competition and Bank Risk-taking Changes in the physical banking networks - number of mergers, consolidations, acquisitions, new banks, closure of banks and number of banks with payment channels

4. Findings of the paper fit into empirical studies

- Research on impact of bank competition rising in recent years but findings remain inconclusive
- Studies focus on evaluating the influence of bank competition on bank risk and stability (Schaeck and Cihak 2014)
 - “Competition-fragility” view vs “Competition-stability” view
- Some studies concentrate on better understanding of underlying regulatory drivers of competition in banking markets (Casu and Girardone 2006).
 - How regulatory, structural and technological changes in banking markets affect competition and economic outcomes
- Studies on how to measure bank competition using market concentration and market power continue to evolve (de-Ramon and Straughan 2020)



5. Measures of bank risk and bank competition

- Measure of bank risk (de-Ramon et al. 2020)

$$(Z - score) Z_{b,t} = (ROA_{b,t} + c_{b,t}) / ROA_{b,t} \quad (1) \quad \uparrow \text{ lower bank risk, lower probability of insolvency}$$

- Measures of bank competition (de-Ramon et al. 2020)

- HHI
- Panzar-Rosse-H-statistic (H-statistic) : \uparrow more competitive banks/system



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5. Measures of bank competition and macro-financial data

- **Measures of bank competition (de-Ramon et al. 2020)**

- Lerner index (LI) : $> > 1$, increasing market power

- $$L_{b,t} = (A_{b,t} - MC_{b,t})/A_{b,t} \quad (2)$$

- $$MC_{b,t} = \frac{TC_{b,t}}{A_{b,t}} [a_{1b,t} + a_{2b,t} \ln A + \sum_{b=1}^3 a_{3t} \ln W] \quad (3)$$

- Boone indicator (BI) : $> > (-)$, higher level of competition

- $$\text{Log} P_{b,t} = \alpha + \beta_1 \text{Log} C_{b,t} + \beta_2 O_{b,t} + \mu_{b,t} \quad (4)$$

- **Vector of macro-financial indicators and bank-specific characteristics (Liu and Wilson 2013)**



6. Empirical model: Panel fixed effects model

$$R_{b,t} = a_b + \beta_1 K_{b,t-j} + \beta_2 V_{b,t-j} + \varepsilon_{b,t} ,$$

where,

$K_{b,t-j}$ = Measure of competition of bank b during quarter-end $t-j$

$V_{b,t-j}$ = Vector of macro-financial indicators and other bank-specific characteristics

$\varepsilon_{b,t}$ = Random error that has a normal distribution

6. Empirical model: Robustness checks

- Panel fixed effects model
- Panel quantile regression model for robustness checks
- Dummy variables for number of changes in physical network, FX liberalization reforms, and Covid-19 period
- Alternative specifications
- Normality of residuals
- Stability test



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7. Results

- Looking at full sample, **competition reduces bank risk taking activities at industry level**
- Total impact of Boone indicator on bank risk highest across bank competition measures
- Negative coefficient for Boone indicator consistent with competition-stability hypothesis; Negative impact for H-stat and positive impact for Lerner consistent with competition-fragility hypothesis
- Impact of competition (Boone indicator) on bank risk of U/KB industry highest across industry groups
- Comparing estimates during pre-pandemic period, estimates show pandemic has increased bank risk

Table 1: Summary of the Impact of Measures of Competition on Bank Risk, March 2010-December 2020

Banking Group	Pre-Pandemic Period (March 2010-December 2019)				With Pandemic Period (March 2010-December 2020)			
	HHI ¹	H-Stat	Boone	Lerner	HHI ¹	H-Stat	Boone	Lerner
	Coef. ²	Coef. ²	Coef. ²	Coef. ²	Coef. ²	Coef. ²	Coef. ²	Coef. ²
U/KB	0.002**	-0.052**	-0.302**	0.022*	0.005*	-0.118**	-0.539**	0.028*
TB	0.015**	-0.162*	-0.043*	0.208**	0.037*	-0.162*	-0.031*	0.019**
R/CB	0.070**	0.123*	-0.125*	0.104***	0.011	0.127***	-0.045***	0.456**
Total Impact	0.087	-0.091	-0.470	0.334	0.053	-0.153	-0.615	0.503
Total impact (By period, excluding HHI)				-0.221				-0.265
Difference ³					-0.034	-0.062	-0.145	0.169

¹ Refers to the Herfindahl-Hirschman Index.

² The symbols *, **, and *** represent significance of regression coefficients at 10%, 5% and 1% levels of significance, respectively.

³ Difference from pre-pandemic period.

Source: Author.



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Table 2: Bank Competition, Bank Efficiency and Bank Risk – Using Boone Index as Statistic
March 2010-December 2020

Independent variables	Dependent variable (I) UKB/KB Group Z-Score (ZSCORE)		Dependent variable (II) Thrift Bank Group Z-Score (ZSCORE)		Dependent variable (III) Rural/Coop Bank Group Z-Score (ZSCORE)	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Boone	-0.323	(0.032)*	-0.031	(0.935)**	-0.042	(0.002)*
Boone ²					0.002	(0.001)**
Bank-specific characteristics						
DEP (-1) (Ratio of deposits/total liabilities)	-	-	-	-	-	-
TLP(-1)	-	-	-	-	0.152	(0.022)**
LIQ(-1) (Ratio of liquid assets/deposits)	-	-	-	-	-	(-)
CI (-1) (Cost-to-income ratio)	-0.685	(0.351)***	-0.136	(0.023)***	-0.245	(0.024)**
Boone(-1) * CI(-1) (Interaction term)	-0.575	0.685	-0.495	(0.151)*	-0.024	(0.023)*
DV (-1) (Diversification index)			-0.043	(0.077)**	0.059	(0.032)*
CAP (-1) (Ratio of total capitalization to total assets)	-0.354	(0.036)***	-0.088	(0.009)***	-0.411	(0.037)**
NPLR (Non-performing loan ratio)	-0.027	0.026	-0.062	0.010	-0.047	(0.002)**
Macro and other indicators						
RGDP (Real GDP growth)	0.039	(0.016)***	0.161	(0.013)***	0.064	(0.019)**
POL (BSP policy rate)	-	-	-0.199	(0.034)***	-	-
DCHANGE (Dummy for changes in banking structure)	0.014	0.033	0.018	(0.034)**	0.069	(0.001)*
DCOV (Dummy for pandemic)	-0.055	(0.023)*	-0.102	(0.056)*	-0.017	(0.007)**
Diagnostics						
Adjusted R ²	0.502		0.683		0.723	
Sample period	2010Q1-2020Q4		2010Q1-2020Q4		2010Q1-2020Q4	
Banks	41		44		457	
No of bank observations (after adjustments)	1,227		968		15,081	
Stability test ¹	0.011		0.026		0.001	
Residual test ²	0.198		0.278		0.199	
Standard error of regression	0.008		0.056		0.041	

Notes: * Based on a separate regression run. Robust standard errors are reported in brackets. The symbols *, **, and *** represent significance levels of 10%, 5% and 1% respectively. ¹ Reports

7. Results

- Relationship between competition and risk is sensitive to other bank-specific characteristics related to size, funding source, capitalization, and macroeconomic factors
- Impact of changes in physical banking network on bank risk is positive and significant for large banks; negative for smaller banks

8. Conclusion

- Competition reduces bank risk taking activities at the industry level
- Competition-fragility and competition-stability hypotheses are holding simultaneously for U/KB and R/CB industries
- Competition and bank risk is sensitive to other bank-specific characteristics and macroeconomic factors related to cost efficiency, extent of diversification strategy, funding source, capitalization and growth of real Gross Domestic Product
- Impact of changes in the physical banking networks on bank risk is positive and significant for U/KBs, but negative for TBs, and R/CBs
- Negative impact of Covid-19 pandemic on bank risk-taking
- *Results could be useful inputs for analysis of capital charge for operational risk, determination of D-SIBs, combined effect of competition and innovation on financial stability*



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