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BANK COMPETITION AND FINANCIAL STABILITY IN THE PHILIPPINES AND THAILAND

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Abstract: There are two competing theories on the effect of bank competition on bank's financial stability namely the "competition-fragility" and "competition-stability" view. The "competition- fragility" view declares bank competition erodes market power, decreases profit margin, and reduces franchise value which encourages banks to take on more risk. On the opposite, "competition-stability" view contends that decrease in competitiveness, determined by market power, increases bank risk. To create opportunities for riskier projects, banks charge higher interest rates to borrowers and thus, resulting to fragility. This paper departs from the existing literature focusing on developed countries by measuring competition on forty banks from the Philippines and Thailand from January 1, 2000 to December 31, 2006. It measures stability through loan risk, overall bank risk and bank capitalization on several market power indicators such as the Lerner Index, HHI deposits and loans. The Generalized Method of Moments estimation is then used to control for possible endogeneity for measures of market power. Empirical evidence reveals that the "competition-fragility" view applies in the Philippines while "competition-stability" view holds for Thailand.

Key Words: bank competition; financial stability; the Philippines; Thailand

1. INTRODUCTION

In the banking literature, there are different views regarding the effect of competition on the bank stability. The "competition-fragility" view states that tighter bank competition erodes market power, decreases profit margin, and reduces franchise value. This encourages banks to take on more risk to increase returns, thus becoming financially weak (Berger, Klapper, & Turk-Ariss, 2008). On the other hand, recent studies introduce the "competition-stability" view. This contends that decrease in competitiveness, determined by market power, increases bank risk. In turn, banks charges higher interest rates to borrowers and create an avenue for riskier projects.

Another perspective comes from Boyd and De Nicolo (2005) who assert that higher interest rates produce a set of riskier borrowers due to adverse selection considerations. Riskier projects and borrowers increase the possibility of having financial instability. Thus, if bank competitiveness decreases, so will the possibility of having financial instability. Berger, Klapper, & Turk-Ariss (2008) suggested banks with higher market power have less overall risk exposure.

This study considers the Philippines and Thailand - two developing South East Asian countries that have almost similar banking structures (Gochoco-Bautista, 2001 & Kubo, 2006).

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Both countries were affected by the 1997 East Asian Financial Crisis (EAFC). As a response, the process of financial liberalization sped up in both countries which included the banking industry.

Among the important contributors to a nation's success is the stability of its financial sector of which banking industry strength forms a large part. The presence of bank competition can be a result of foreign bank entry. (Claessens, Demirgüç-Kunt, and Huizinga, 1998) Due to the entry of foreign banks, competitive pressures escalate and forces local banks to take in less credit-worthy customers who bring further risk. (Unite & Sullivan, 2001) This gives reason to compare the intensities of bank competition between the Philippines and Thailand and see which of the two theories prevail.

2. METHODOLOGY

Method of Data Analysis

The outline for econometric methodology will follow that of Berger, Klapper, and Turk-Ariss (2008), yet it departs from the aforementioned paper in terms of the type of data used and the estimator employed. The data is organized as a panel dataset to include observations across banks and across years.

Given the complex relationship between market structure and financial stability in banking, the model allows for a nonlinear relationship between the two. The model is presented in the general form:

$$\text{Financial Stability}_i = f(\text{Market Structure}_i, \text{Market Structure}_i^2) \quad (\text{Eq.1})$$

A. Financial Stability

The dependent variable is financial stability and proxied by the ff. risk exposure indicators:

- 1) loan portfolio risk: through non-performing loans to total loans (NPLs),
- 2) overall bank risk: through the Z-index,

The Z-index is an inverse proxy for the firm's probability of failure. It combines profitability, leverage, and return volatility in a single measure. There is a need to include overall bank risk because even if market power leads to higher loan portfolio risk, a bank's overall risk need not increase. It is given by the ratio:

$$Z = \frac{ROA_i + E/TA_i}{\sigma_{ROA_i}} \quad (\text{Eq. 2}) \text{ where: } ROA_i = \text{annual return on assets for bank } i,$$

assets for bank i ,

E/TA_i = annual equity to total assets ratio for bank i ,

σ_{ROA_i} = annual standard deviation of return on assets

- 3) bank capitalization: through equity-to-total assets

This measures whether banks enjoying greater market power hold more equity capital

as protection to absorb unexpected losses arising from loan portfolio risk.

B. Market Structure

The impact of the banking industry's market structure on risk-taking and financial stability is examined through the proxies of market power namely:

1) Lerner Index,

It represents the mark-up of price over marginal costs and is an indicator of the degree of market power. It is a "level" indicator of the proportion by which price exceeds marginal cost, and is calculated as:

$$Lerner_{it} = (P_{TAit} - MC_{TAit}) / P_{TAit} \quad (\text{Eq. 3})$$

where: P_{TAit} = price of total assets proxied by the ratio of total revenues (interest & non-interest income) to total assets for bank i at time t
 MC_{TAit} = marginal cost of total assets for bank i at time t
 = is estimated on the basis of the following translog cost function adopted from Weil, Pruteanu-Podpial, & Schobert (2006):

$$\ln\left(\frac{TC}{w_3}\right) = \alpha_0 + \alpha_1 \ln y + \frac{1}{2} \alpha_2 (\ln y)^2 + \alpha_3 \ln\left(\frac{w_1}{w_3}\right) + \alpha_4 \ln\left(\frac{w_2}{w_3}\right) + \alpha_5 \ln\left(\frac{w_1}{w_3}\right) \ln\left(\frac{w_2}{w_3}\right) + \frac{1}{2} \alpha_6 \left(\ln\left(\frac{w_1}{w_3}\right)\right)^2 + \frac{1}{2} \alpha_7 \left(\ln\left(\frac{w_2}{w_3}\right)\right)^2 + \alpha_8 \ln y \ln\left(\frac{w_1}{w_3}\right) + \alpha_9 \ln y \ln\left(\frac{w_2}{w_3}\right) + \varepsilon \quad (\text{Eq.4})$$

where: $TC/w_3 = Cost_{it}$

y or Q_{it} = proxy for bank output or total assets for bank i at time t

w_1 = operational expenses to total assets (labor's price)

w_2 = other operating and administrative expenses to total assets (physical capital's price)

w_3 = interest expense to total deposits (borrowed capital's price)

Following the previous derivation, MC_{TAit} is then computed as:

$$MC_{TA} = \frac{Cost_{it}}{Q_{it}} \left[\beta_1 + \beta_2 \ln Q_{it} + \sum_{k=1} \phi_k \ln W_{k,it} \right] \quad (\text{Eq. 5})$$

Where: $W_{k,it}$ = interaction of three input prices (w_1 , w_2 and w_3)

2) HHI deposits and loans

Both HHI deposits and loans were computed using the Herfindahl-Hirschman Index (HHI), the traditional measure of market power. It is the sum of the squares of the individual market shares of all market participants in terms of deposits and loans.



Statistical Tools and Metrics

To address endogeneity of variables such as measures of market structures, the Generalized Method of Moments (GMM) estimator was employed, specifically the Arellano-Bond estimator for dynamic panel data analysis.

A common problem in using panel data is heteroskedasticity. The usual diagnostic tests for endogeneity and overidentifying restrictions are also invalid if heteroskedasticity is present. The usual approach when facing heteroskedasticity of an unknown form is to use the GMM estimator, introduced by Hansen (1982). GMM does not require distributional assumptions on the error terms; it is also more efficient than the Two-Stage Least Squares (2SLS) estimator because it accounts for heteroskedasticity (Hall, 2005).

Arellano and Bond (1991) developed a GMM estimator that treats the model as a system of equations, one for each time period. This estimator is designed for datasets with many panels and few periods, and it requires that there be no autocorrelation in the idiosyncratic errors

Sampling Design and Data Collection Method

Due to the large extent of this study covering two countries, the sample is limited to twenty publicly listed banks per country. This is to ensure consistency and comparability of data derived from published financial statements, which is the primary data source for this study. The years covered in this study are from 2000 to 2006 in order to exclude years affected by the 1997 EAFIC and 2008 Global Financial Crisis, since these may bring abnormal results to the model.

The primary sources of data for this study are published financial statements from OSIRIS database (as provided by the Fitch- International Bank Credit Analysis Ltd.) and various annual reports. Variables consisting of national output such as total deposits and total loans are based from the Bank of Thailand (BoT) and the Bangko Sentral ng Pilipinas (BSP).

3. RESULTS AND DISCUSSION

There are a total of eighteen regressions – nine for each country. Each proxy for financial stability (NPL Ratio, Z-index and Bank Capitalization) is paired against each proxy for market structure (Lerner Index, HHI deposits and HHI loans).

Table 3.1 Effect of Market Power on Non-Performing Loans

The dependent variable is the ratio of non-performing loans to total loans against the following proxies for market power: the Lerner index, HHI deposits, and HHI loans. GMM standard errors appear in parentheses below estimated coefficients. The Wald χ^2 statistic affirms the model's goodness of fit; while ***, **, and * indicate statistical significance at the 1%, 5%, and 10% confidence levels, respectively.

Market Structures	Model 1: Lerner Index		Model 2: HHI Deposits		Model 3: HHI Loans	
	Philippines	Thailand	Philippines	Thailand	Philippines	Thailand
Degree of Market Power	-0.1354 (0.0199)***	-0.0618 (0.0089)***	-4.5379 (0.4108)***	-255.6922 (35.5158)***	-94.5204 (20.4120)***	14.5434 (5.2994)***
Degree of Market Power Squared	0.0575 (-0.0452)	-0.1526 (0.0156)***	65.5183 (5.8781)***	1612.141 (222.267)***	911.1743 (185.4137)***	-125.4385 (43.4843)***
Inflection Point	1.18	-.20	.03	.08	.05	.06
Sign of Relationship	-	+/-	-	+	-	-
Constant	0.8380 (0.1520)***	1.3059 (0.2737)***	2.0607 (0.1163)***	10.1933 (1.6142)***	4.0221 (0.5968)***	0.3667 (-0.4102)
Number of Obs.	69	76	73	76	73	76
First Stage Results	-0.1112 (-0.0991)	0.2886 (0.0428)***	0.2098 (0.0197)***	0.6712 (0.0758)***	0.1885 (0.0436)***	0.6071 (0.0855)***
Wald χ^2	1607.44	1864.66	17806.55	4472.94	12912.84	1989.96
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

In the Philippines, as seen in Table 3.1 (Effect of Market Power on NPLs), coefficients for the linear term of market power indicators are negative while coefficients for the quadratic terms are positive across all proxies. To determine the type of relationship between market power and NPLs, the inflection point is calculated for every estimated function by setting the first-order derivative to zero and compared to the distribution of data. Like in the case of Model 2 and 3, the inflection point is .03 and .05 respectively while the 75th percentile of HHI deposit and loans data occurred at .027 and .051, implying that 75% of the degree of market power data lies below the inflection point. Given that the sign of the quadratic coefficients in Models 2 and 3 is positive, a negative relationship is relatively established between HHI deposits & loans and NPLs. In line with the “competition- fragility” view, Philippine banks imply that less market power associates banks taking riskier loan portfolio.

As for Thailand’s results in Table 3.1, for Models 2 and 3, approximately 75% of the data lies above the inflection point (the 25th percentile of HHI deposit and loan data occurring at .075 and .043 respectively). Given that the signs of the quadratic coefficients in Models 2 and 3 are positive and negative respectively, then a positive and negative relationship is relatively established between HHI deposits, loans & NPLs. In the case of Thailand, in terms of the relationship of market power and loan portfolio risk, it is hard to establish a certain relationship since the results of the Lerner Index, HHI deposits and loans give conflicting sign relationships.

Table 3.2 examines the impact on overall bank risk, using the Z-index. Higher values for this index may come from higher earnings or more capital indicating greater financial stability, while greater variability in earnings reduces the Z-index causing a bank’s overall risk to increase.

Table 3.2: Effect of Market Power on Z-Index
 The dependent variable is Z-index, an inverse measure of overall bank risk..

Market Structures	Model 1: Lerner Index		Model 2: HHI Deposits		Model 3: HHI Loans	
	Philippines	Thailand	Philippines	Thailand	Philippines	Thailand
Degree of Market Power	2.4382 (0.1178)***	3.1559 (0.5105)***	3.5351 (1.3359)***	10399.12 (1506.362)***	-861.1655 (51.1362)***	1366.94 (254.9732)***
Degree of Market Power Squared	-0.3120 (-0.2288)	-0.2918 (0.0561)***	78.8430 (13.6360)***	-63125.03 (9336.02)***	7296.797 (465.848)***	-10294.5 (1978.535)***
Inflection Point	3.91	5.41	.02	.08	.06	.07
Sign of Relationship	+	+	+	-	-	-
Constant	-2.5852 (0.8465)***	-72.1901 (5.5234)***	-1.2534 (-0.9248)	-587.6911 (68.9218)***	19.1774 (1.4670)***	-16.5696 (-13.9450)
Num. of Obs.	84	95	88	95	88	95
First Stage Results	-0.2221 (0.0019)***	-0.0572 (0.0045)***	-0.1453 (-0.0009)	-0.0601 (-0.0087)	-0.1465 (0.0007)***	-0.0664 (0.0062)***
Wald χ^2 Prob > χ^2	29065.84 0.0000	2400.31 0.0000	1.51E+06 0.0000	1415.93 0.0000	523390.48 0.0000	52214.74 0.0000

For Philippine banks in Table 3.2, Models 2's estimated quadratic function has an upward oriented parabola shape with positive linear term. Since approximately 75% of the data lies above the inflection point (the 25th percentile of HHI deposit data occurring at .027), then there is a positive association between market power and Z-index. Regarding Model 3, around 99% of the degree of market power data lies below the inflection point (the 99th percentile of HHI loan data occurring at .056). Since the estimated quadratic function has a positive trend then there is a negative association between market power and Z-index. Overall, majority of the Philippine findings are consistent with the "competition-fragility" view in terms of market power and Z- Index. This means an increase in competition is likely to erode the franchise value of banks and encourages them to increase their overall risk exposure.

For Thai banks in Table 3.2, Model 1 has around 99% of the degree of market power data lies below the inflection point (the 99th percentile of Lerner Index data occurring at 2.25). Given that Models 1's estimated quadratic function has a downward oriented parabola shape then it has a positive relationship between market power and Z-index. For Models 2 and 3, approximately 75% of the data lies above the inflection point. Given that the sign of the quadratic coefficients in Models 2 and 3 is negative, a negative relationship is relatively established between HHI deposits, loans and Z- Index. In sum, majority of the Thai findings are consistent with the "competition-stability" view in terms of market power

and Z- Index.

For the Philippines, in Table 3.3 (Effect of Market Power on Bank Capitalization), Model 1 has around 99% of the degree of market power data lies below the inflection point (the 99th percentile of Lerner Index data occurring at -.083). Given that Models 1's estimated quadratic function has a downward oriented parabola shape then it has a positive relationship between market power and bank capitalization. Model 1 signifies bank capitalization levels are higher for banks with more market power while Models 2 and 3 imply that half of banks with more market power do hold more equity capital. This establishes that more market power in banks means more equity capital to protect themselves from loan portfolio risk, thus "competition- fragility" view applies.

Table 3.2: Effect of Market Power on Bank Capitalization
 The dependent variable is equity-to-total assets ratio.

Market Structures	Model 1: Lerner Index		Model 2: HHI Deposits		Model 3: HHI Loans	
	Philippines	Thailand	Philippines	Thailand	Philippines	Thailand
Degree of Market Power	0.0511 (0.0114)***	-0.0830 (0.0030)***	-2.3247 (0.1585)***	163.5582 (61.7943)***	-38.4568 (3.6533)***	-23.0742 (3.4638)***
Degree of Market Power Squared	-0.1655 (0.0213)***	0.0315 (0.0004)***	38.2029 (3.1675)***	-1040.026 (379.2469)***	371.1926 (34.695)***	196.0633 (29.0532)***
Inflection Point	.15	1.31	.03	.08	.05	.06
Sign of Relationship	+	-	+/-	-	+/-	+
Constant	0.8174 (0.0829)***	2.4281 (0.1649)***	2.0157 (0.2018)***	3.8220 (-3.0580)	2.8846 (0.1260)***	9.8894 (-0.5464)
Number of Obs.	83	95	87	95	87	95
First Stage Results	0.2456 (0.0345)***	-0.0009 (-0.0006)	0.3623 (0.0210)***	0.0548 (0.0282)*	0.3505 (0.0065)***	0.0416 (-0.0030)
Wald χ^2	1630.82	3.22E+09	4.08E+05	43754.79	1.12E+07	143492.41
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

For Thailand, Model 1 has around 95% of the degree of market power data lies below the inflection point (the 95th percentile of Lerner Index data occurring at .93). Given that Models 1's estimated quadratic function has an upward oriented parabola shape then it has a negative relationship between market power and bank capitalization. For Models 2 and 3, approximately 75% of the data lies above the inflection point. Given that the sign of the quadratic coefficients is negative for HHI deposit and positive HHI loans, a negative relationship is relatively established between HHI deposits and bank capitalization and a positive relationship between HHI loans and bank capitalization. Overall, majority of the



proxies for market power indicates that less market power in banks hold more equity capital, thus verifying the “competition- stability” view.

4. CONCLUSION

Empirical estimation on bank competition in the Philippines supports the “competition-fragility” view across 3 proxies for financial stability. Evidently, decreased market power associates banks taking more risky loan portfolio which may increase overall risk exposure of individual banks. Banks having lesser degrees of market power indeed hold lesser levels of capitalization as reflected in the regression results. Similarly, Unite and Sullivan (2001) observed foreign bank entry in the Philippines introduces competition that forces domestic banks to take on less creditworthy customers. The study also relates foreign bank entry to an increase in risk.

On the other hand, estimation on the bank competition in Thailand supports the “competition-stability” view across majority of the proxies for financial stability. Based on the results, the effect of loan portfolio risks born by competition among banks is undeterminable. Despite this, findings demonstrate that the presence of competition in Thai banks reduces overall bank risk. Thus by having lower market power, banks have less risk appetite which results to lower interest rate given by banks. The low interest rates given by banks could mean easier payments made by customers and lessens default.

For further research, a longer time period may be used to capture the effect of changes in the business cycle (e.g. bust cycle) such as the years after 2008. Lastly, inclusion of more countries could be done yet having this extension prompts future researchers to also consider a cross- sectional data rather than this study’s panel data.

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