# Competition and Risk Taking Behavior of Banks: New Evidence from Market Power and Capital Requirements

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## Abstract

*The relationship between competition and banking stability has resulted in two opposing paradigms; competition-fragility view suggests that increased competition erodes market power and encourages banks to take excessive risks. In contrast, the competition-stability view suggests that, low competition results in more market power which may encourage the banks to charge higher loan rates adversely affecting borrowers by risk shifting mechanisms. Given these opposing predictions in the literature, this study aims to test the two views, considering the effects of market power and capital requirements on the riskiness of Pakistani banks. Utilizing annual data for 30 banks over the period of 2004 to 2017, in a dynamic two step system GMM. We construct Lerner index as a direct measure of market power for the banking industry. Our findings support the competition stability paradigm in the case of Pakistan. We also find that the theoretical link between capitalization ratio and market power is sufficiently strong and should be encouraged as greater capital buffers reduce risk exposure.*

***Key Words*:** Banking Stability, Capital Adequacy, Competition, Lerner Index, Market Power.

**JEL Classification:** G21, G32, L1

## Introduction

Given the context of banks' safety and soundness, the relationship between competition and stability has long been debated. Several studies have shed light on the said nexus, however the evidence is largely contentious and

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inconclusive. There are two predominant and contrasting hypotheses which view the relationship between competition and stability in different ways (Berger et al., 2009; Cihák et al., 2006). One is the competition-stability and the other is competition-fragility view.

The competition-stability view mainly draws from (Boyd & De Nicolo, 2005), who suggested a tradeoff between risk and incentive mechanisms of banks. Less competitive markets, allow banks to exercise *market power* enabling them to charge higher rates and earn more as their markets become concentrated, which in turn may become difficult for the borrowers to pay off. Thus making it more risky. To supplement higher rates, borrowers tend to undertake risky projects, resulting in increased defaults. More borrowers' defaults affect banks' solvency through risk shifting mechanisms (Stiglitz & Weiss, 1981) and adds on to the fragility of the entire financial system.

In contrast, the competition-fragility view, advocates that due to higher level of competition banks' margins and market power are eaten away, which in turn induce the banks to take on risky projects thus adding into fragility (Keeley, 1990; Marcus, 1984; Martinez-Miera & Repullo, 2010; Matutes & Vives, 2000). Following the seminal work of (Keeley, 1990), several studies indicate that higher competition results in enhanced moral hazard in banking system and thus it is suggested that less competitive and relatively more concentrated banking conditions are expected to be relatively stable (Martinez-Miera & Repullo, 2010; Jiménez et al., 2013).

In short, the literature largely provides mixed evidence that whether competition and stability are positively or negatively linked. However it's worth mentioning that, the said relationship is largely investigated for advanced economies, and very little attention has been paid towards developing and emerging economies. (Kasman & Kasman, 2015) argues that financial liberalization, deregulation and large scale restructuring across markets have changed the competitive landscape in banking, both in developed and developing economies; forcing the banks to operate on low profit margins and eroding market power. Similarly (Sarkar & Sensarma, 2016) argues that since, emerging economies are rapidly undergoing drastic structural changes, it has become extremely challenging for the policy makers to maintain stability. Hence it is imperative to understand the wide ramification of competition stability and or fragility nexus as any such aggravation can pose systemic risk.

To fill that gap, we investigate the competitive conditions for banks in Pakistan. In addition, we apply a structural neo-organizational approach for the first time in a country specific settings by estimating Lerner Index as a direct measure of market power by following (Berger et al., 2009) and (Forssbaeck & Shehzad, 2015).

The construction of the Lerner index for Pakistani banks in itself is a contribution as to the best of our knowledge, to date, no such attempt has been made except that of (World Bank, 2011) The only closely relevant study is that of (Mirza et al., 2016) who measures the degree of competition for Pakistani banking sector with Hall-Roeger indicator, Panzer-Rosse's H-statistics, the Boone's indictor and Bresnahan-Lau procedure over 2004 to 2012. Similarly, (Khan & Riazuddin, 2009) assessed the degree of competition for the banking industry of Pakistan using only the Panzer-Rosse H-Statistic. Similarly, another effort by (Afzal & Mirza, 2010) measures market power in terms of banks' market share. However, they still fall short to construct Lerner index as a direct measure of market power. In short this is a major gap and is intended to be traversed in the current study.

## Tools and Methods

### *Dependent Variables: Risk Measures*

Liquidity Risk: As per the *'Theory of Financial Intermediation*, banks are considered as financial intermediaries, pooling deposits and lending these to create loans (Werner, 2016). Under this theory, banks are also responsible for the creation of liquidity. In the words of (Dewatripont, Rochet, & Tirole, 2010) liquidity is created (by banks) by borrowing short and lending long. This mismatch of maturity timings sometimes create a potential problem of liquidity risk, which arises when a firm is unable to meet its liabilities upon becoming due. Furthermore with the implementation of Basel III accord, liquidity risk in particular has received much interest, due to its importance during periods of crises alluded to the fact that banking activity is largely characterized by this key risk (Tanda, 2015). Given this, we adopt the ratio of liquid assets to total assets, where higher ratio indicates lower liquidity risk and vice versa (Bourkhis & Nabi, 2011; Demirgüç-Kunt & Huizinga, 2004; Hussein, 2010; Sarkar & Sensarma, 2016).

$$Liquidity\ Risk = \frac{Liquid\ Assets}{Total\ assets} \qquad \ldots (4)$$

Default Risk: Also known as solvency risk, is widely captured in the banking literature by Z-Scores. Unlike liquidity risk, Z-Score indicates the overall bank risk (Abedifar, Molyneux, & Tarazi, 2013; Bakkar, Rugemintwari, & Tarazi, 2016; Beck, 2008; Cabrera, 2016; Čihák & Hesse, 2010; Hesse & Čihák, 2007; Kasman & Kasman, 2015; Laeven & Levine, 2009; Smith, De Nicoló, & Boyd, 2003). Z-scores are calculated taking accounting based asset returns and equity's volatility as given below;

$$Z_{it} = \frac{ROA_{it} + (\frac{E}{TA})_{it}}{\sigma ROA_{it}} \qquad \dots (1)$$

Where *ROA* is the accounting measure of return on assets and *E/TA* is the equity ratio for bank *i* at time *t*. Whereas *σ(ROA)* is the standard deviation of *ROA*. The scores combine profitability, leverage and volatility in returns given by its *ROA*, *E/TA* and *σ(ROA)* respectively and indicates the distance in terms of the number of standard deviation of return on assets a bank is far from solvency and the likelihood of failure ( Boyd & Runkle, 1993; Boyd, Nicoló et al., 2004; De Nicolò, & Jalal, 2006). A higher Z-score suggests greater stability and lower probability of insolvency and vice versa.

***Explanatory Variables***

***Measuring Market Power:*** Market power is a reflection of a firm's ability to set prices above its marginal cost (Lerner, 1934; Williams, 2012). A common practice to measure market power in the banking industry is the Lerner index which is been extensively used in the banking literature and indicates the relative price difference between marginal cost scaled by the price of a firm's output and is therefore inversely related to competition (Forssbaeck & Shehzad, 2015). The Lerner index has got several advantages over its peers such as the Panzer and Rosse H-Statistic and the Boone indictor that it measures market power at the bank year level. Furthermore, (Iveta, 2012; Rojas, 2011) indicates that Lerner index illustrates the behavioral departure point for imperfectly competitive markets from the benchmark of perfect competition. The index ranges from 0 to 1, with 0 means perfect competition and 1 indicating monopoly representing the conjectural variations of elasticity of the total banking output in terms of the output by Bank *i* (Soedarmono & Tarazi, 2014). It is expressed as inverse of the price elasticity such as;

$$Lener = \frac{(P_{it} - MC_{it})}{P_{it}} \qquad \ldots (2)$$

Where $P_{it}$ indicates output prices, proxied by the ratio of total earning assets to total assets and $MC_{it}$ are marginal costs for bank *i* at time *t* respectively. The marginal costs is derived from a translog cost function using a system of equations with respect to one output (the ratio of earning assets over total assets) and three inputs (prices for capital, funding and labor) by following (Degl'Innocenti, Mishra, & Wolfe, 2017; Demirgüç-Kunt & Martinez Pería, 2010; Forssbaeck & Shehzad, 2015; Maudos & de Guevara, 2007; Williams, 2012) as;

$$\begin{aligned} lnTC = \alpha + \sum_{k=i}^{1} \beta_k \ln(Y_{kit}) + \sum_{h=1}^{3} \beta_h \ln(W_{hit}) \\ + \sum_{h=1}^{3} \sum_{m=1}^{3} \frac{1}{2}\, \gamma_{hm}\, \ln(W_{hit})\, \ln(W_{mit}) + \sum_{k=i}^{1} \frac{1}{2}\, \delta_k\, (\ln(Y_{kit}))^2 \\ + \sum_{h=1}^{3} \sum_{k=i}^{1} \vartheta_{hk} \ln(W_{hit})\, ln\,(Y_{kit}) + \sum_{n=i}^{1} \pi\, T^n + \sum_{h=1}^{3} \sigma_h \ln(W_{hit}) T \\ + \sum_{k=i}^{1} \varphi_k \ln(Y_{kit}) \mathrm{T} + \sum_{p=1}^{p} X_{pit} + u_{it} \qquad \ldots (5) \end{aligned}$$

The above specification indicates total cost (*TC*) as a function one output ($Y_k$) with three inputs of capital, labor and funding presented by ($W_h$), a time trend (*T*) representing technological and technical change. A set of bank level specific control variables are presented by the vector ($X_p$) which in our case is equity. We follow the stochastic frontier approach and estimate the above system as constrained linear regression with restrictions of linearity and homogeneity (Degl'Innocenti et al., 2017; Forssbaeck & Shehzad, 2015; Koetter, Kolari, & Spierdijk, 2012). Finally, to construct the Lerner index, the marginal costs are then derived by differentiating as given by;

$$MC_{Lit} = \frac{\partial TC_{it}}{\partial \ln Y_t} = \begin{bmatrix} \beta_L + \beta_{L1} \ln Y_t \\ + \sum \beta_{hL}\, lnW_{hit} + \theta_L T \end{bmatrix} \frac{TC_{it}}{Y_t} \ldots (6)$$

## Capital Adequacy Ratio

Capital adequacy ratio is a measure of banks' capital buffer against contingent losses (Afzal, 2015). Banks having higher capital buffer are considered less risky as higher capitalization provides with a safety cushion and makes the banks less vulnerable to negative shocks. We consider capital adequacy ratio as a measure of regulatory framework, as every bank is required to maintain a healthy CAR (minimum 11.3% as of December 2017 in the case of Pakistan) as per regulatory mandatory minimum capital requirements under the auspices of Basel Committee for Banking Supervision (BCBS) and Basel accords. The association between risk taking and capitalization ratio is well documented in literature (for instance see (Haq, Avkiran, & Tarazi, 2016) and (Ghanem, 2015; Tanda, 2015) for a comprehensive review). Moreover, we consider banks' CAR for its potential effects on bank lending behavior and as a potential indicator of capital crunch issues (Soedarmono & Tarazi, 2014). Following the BCBS guidelines we estimate CAR as follows;

$$CAR_{it} = \frac{\ln(Capital\ Base)_{it}}{\ln(RWA)_{it}} \quad \dots (13)$$

Whereas the capital base indicates the sum of Tier-I and Tier-II capital while RWA indicates risk weighted assets.

***Control Variables***

To control for different bank specific characteristics, we include natural log of total assets to control for size and possible heterogeneity arising from economies of scale. Similarly heterogeneity arising from profitability is controlled for by return on assets (ROA). Whereas a macroeconomic control variable in the form of real GDP growth rate is also included to control for business cycle variations. As we believe that risk related measures of banks are pro-cyclical, thus a macroeconomic control variable is necessary and important. 2.3

**Empirical Research Design and Econometric Specifications**

In order to test the relationship between market power, riskiness of Pakistani banks and capital requirements, we set up a general model to specify the relationship as follows;

$$Risk_{it} = \alpha_{it} + \beta_1 MP_{it} + \beta_2 CAR_{it} + \sum_{i=1}^{k} \beta_{3+i} (Bank\ Specific\ Control)_{kit} + \sum_{j=1}^{m} \beta_{4+m} (Macro - Level\ Control)_{mit} + \varepsilon_{it}, \quad \ldots (9)$$

Where, MP presents the measures for market power, i.e. the Lerner index, CAR indicates the capitalization ratio. Bank specific control include, bank size and ROA whereas macroeconomic control include business cycle proxied by real GDP growth rate as in (Kasman & Kasman, 2015). Finally, risk indicates distress indicators for liquidity and default risk. Whereas the $\varepsilon_{it}$ is the stochastic disturbance term that is believed to be white noise and is expressed under the assumptions as;

$$\varepsilon_t \sim IID\ (0, \sigma^2)\ \ldots\ (10)$$

Equation (10) summarizes that $\varepsilon_t$ should be independently and identically distributed (Aleemi & Azam, 2015; 2017).

## Estimation Methodology

We employ dynamic panel data methods to cater for several issues such as simultaneity, endogeneity and unobserved biases from bank level heterogeneity. Further, dynamic panel models are also appropriate to cope with the issues of reverse causality that may arise between dependent and explanatory variables. To cope with these and other such potential issues such as elimination of serial correlation, several studies adopt dynamic models such as Dynamic Ordinary Least Squares (DOLS), Instrumental Variables Regression and Two-Stage Least Squares (2SLS) methods with instrumental variables. However, (Hall, 2005) has shown that these techniques are not that much robust as they do not account for heteroscedasticiy. (Baum, Schaffer, & Stillman, 2003) calls it an omnipresent issue in empirical research and suggests taking advantage of the GMM's orthogonality conditions to cater for heteroscedasticiy of unknown form. Thus in this study we follow the procedures outlined by (Arellano & Bover, 1995) and (Blundell & Bond, 1998) and employ a two-step system Generalized Method of Moments (GMM) technique.

The System GMM is an extension of the standard GMM approach proposed by (Arellano & Bond, 1991). Furthermore, (Hall, 2005) argues that system GMM is more efficient than 2SLS as it accounts for heteroscedasticiy and is free of the requirements for distributional assumptions about the error term, which in many cases could be a huge advantage. Moreover, the system GMM is shown by (Baltagi, 2008) to produce more precise and efficient estimates compared to the standard GMM and helps to reduce biases and precision issues by way of differencing variables.

The system GMM is first estimated in levels and then in differences by including lagged explanatory variables as instruments. The right hand side variables in a system GMM are considered as endogenous variables and are allowed to orthogonally adopt their first differenced lags as instruments. Following (Kasman & Kasman, 2015) we include a lagged explanatory variable for bank stability measures. As a relatively unstable bank is likely to exhibit distress in the following period which is an indication of the persistency in bank risk taking behavior.

Finally, to test the stability and goodness of fit of our estimated models, we apply the Hansen-J Test and AR (2) test to check for the over identifying restrictions and second order correlation respectively. When both the Hansen-J test and the AR(2) tests are insignificant at a given level of confidence interval, show the validity that the identifying restrictions are valid and that second order correlation among first-differenced errors do not exist respectively.

**Sampling and Data**

Our sample period comprises of the post reforms era and spans from 2004 to most recent 2017 whereby the regulatory, supervisory and disciplinary requirements of Basel III accord was adopted in Pakistan. Data is collected from the official annual financial statements for 30 scheduled banks during the period.

## Findings

### *Lerner Index*

The mean annual Lerner index are reported in Table 2 and their evolution through the sampled period is depicted in Figure 1. A great advantage of Lerner over other measures of competition and market power is that it provides a direct measure of pricing power per year at bank level.

**Table 2:**
*Lerner Index over the sampled period*

| Year | *Lerner* |
|---|---|
| 2004 | 0.434 |
| 2005 | 0.531 |
| 2006 | 0.515 |
| 2007 | 0.549 |
| 2008 | 0.613 |
| 2009 | 0.657 |
| 2010 | 0.632 |
| 2011 | 0.617 |
| 2012 | 0.623 |
| 2013 | 0.596 |
| 2014 | 0.556 |
| 2015 | 0.492 |
| 2016 | 0.414 |
| 2017 | 0.381 |

Consistent with theory, the mean Lerner index indicate competitive conditions in Pakistani banking industry. Overall, the industry witnessed slight to moderate improvement in terms of market power (from 0.434 in 2004 to 0.381 in 2017). On average, the industry remained to be monopolistically competitive during the entire sampled period that could be alluded to the higher level of concentration and consolidation, amalgamations in the banking industry and strong monitoring and stringent policies of SBP particularly evident after the global financial crisis. The intuition of this line of reasoning is consistent with that of (Beck, Demirgüç-Kunt, & Levine, 2006; Beck, 2007). Moreover, increased consolidation can potentially lead to collusion among larger banks as corroborated by (Bos, Kolari, & Van Lamoen, 2013).

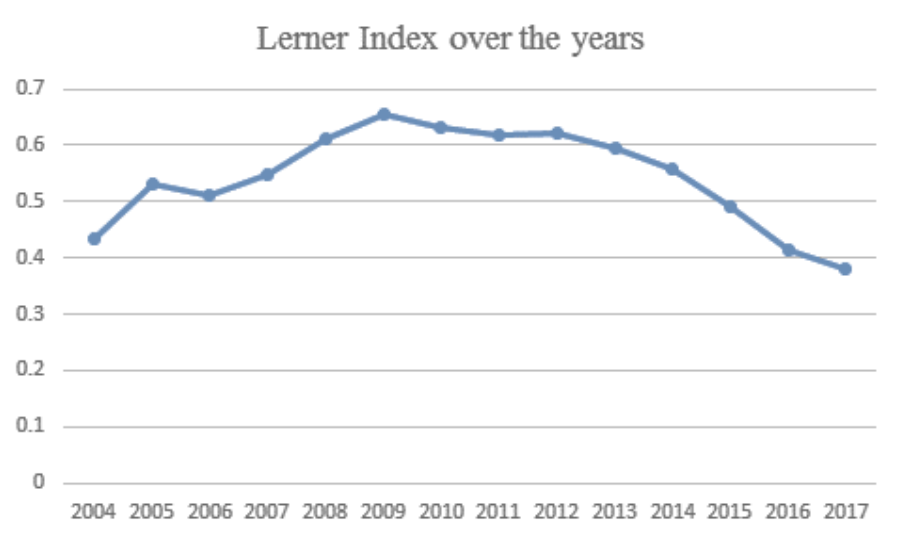


***Figure 1: Evolution of Lerner Index over the years***

Furthermore, our results are in line with (Bikker, Spierdijk, & Finnie, 2007; Claessens & Laeven, 2004; Hassan, 2009; Khan & Riazuddin, 2009). In addition, the downward bias of competition levels despite multilevel deregulations and liberalization reforms, are also in line with recent empirical literature such as (Bikker & Spierdijk, 2008; Bos et al., 2013; Degl'Innocenti et al., 2017; Koetter et al., 2012; Stiroh & Strahan, 2003) among others. However, these findings are in contrast with (Hanif, 2017; Mirza et al., 2016) who reports perfect competition through estimation of Panzer and Rosse H-statistic for Pakistan, to which, our results are difficult to compare if not comparable at all.

### *Impact of Market Power and Capital Requirements on Banking Stability*

Table 4 reports findings estimated through two step dynamic system GMM, suggesting significantly positive influence of market power in case of liquidity risk whereas negative influence in terms of default risk. Indicating that increased competition results in decrease in riskiness of banks. This line of reasoning is consistent with the competition stability view.

Focusing on the liquidity risk (indicated by the ratio of liquid assets) reveals that market power positively influences liquid assets and hence decreasing liquidity risk in the case of Pakistan. The estimated coefficients are statistically significant and consistent across specifications. These findings are in line with (Sarkar &

Sensarma, 2016) who reported similar findings for Indian banking industry. Moreover, profitability measure is positively influencing liquidity ratio suggesting that those banks who are generating higher profits will tend to have lower liquidity problems. However, the coefficient is statistically insignificant. Similarly, coefficients for size and cycle are significantly positive indicating that large banks are having slightly higher levels of liquid assets and that these large banks may not have difficulties in meeting their obligations. Similarly higher level of economic activity is also associated with holding slightly higher levels of liquid assets in the case of Pakistan. These findings are consistent with (Sarkar & Sensarma, 2016).

Similarly, in line with the competition stability view, market power is negatively affecting default risk. This finding is in contrast with (Forssbaeck & Shehzad, 2015) and suggests that increased competition is negatively associated with default risk. Similarly, ROA, size and cycle are negatively associated with default risk suggesting that increased profitability, enhanced economic activity and larger bank size will result in lower default risk in the case of Pakistan.

***Table 3:*** **Descriptive Statistics and Pairwise Correlations**

| Variable | Mean | Standard Deviation | Maximum | Minimum | N |
|---|---|---|---|---|---|
| *LR* | 0.472 | 0.127 | 0.819 | 0.074 | 385 |
| *DR* | 2.126 | 3.684 | 28.190 | -2.854 | 385 |
| *Lerner* | 0.706 | 0.197 | 0.867 | -2.028 | 385 |
| *CAR* | 16.555 | 10.244 | 61.83 | -4.62 | 385 |
| *ROA* | 0.378 | 1.943 | 6.430 | -7.430 | 385 |
| *Size* | 18.890 | 1.375 | 21.710 | 15.207 | 385 |
| *Cycle* | 3.821 | 1.401 | 6.18 | 1.61 | 385 |

| | *LR* | *DR* | *LL* | *CAR* | *ROA* | *Size* | *Cycle* |
|---|---|---|---|---|---|---|---|
| *LR* | 1 | | | | | | |
| *DR* | 0.278 | 1 | | | | | |
| *Lerner* | 0.087 | 0.152 | 1 | | | | |
| *CAR* | 0.358 | 0.137 | 0.181 | 1 | | | |
| *ROA* | 0.305 | 0.676 | 0.287 | 0.399 | 1 | | |
| *Size* | 0.232 | 0.315 | 0.306 | 0.078 | 0.445 | 1 | |
| *Cycle* | 0.204 | 0.139 | 0.217 | 0.085 | 0.220 | 0102 | 1 |

Similarly, focusing on the restraining effects of capitalization requirements on stability indicators, we postulate that risk exposure of banks will be reduced with higher capital buffers. Our results support this view suggesting that holding higher capital will significantly reduce bank's risk exposure in terms of liquidity as well as default risk. These findings are consistent with most of the relevant literature. Moreover, for robustness purposes, we also report bank level fixed effects for both models. Where it can be clearly observed that our results largely remain unchanged and are robust across specifications with only a few exceptions. However, we prefer and go by the results of two step system GMM for its dynamic nature and properties.

***Table 4:***
**Regression Results**

| **Dependent Variable** | ***Liquidity Risk*** | | ***Default Risk*** | |
|---|---|---|---|---|
| | ***GMM*** | ***FE*** | ***GMM*** | ***FE*** |
| $Dep_{t-1}$ | -0.046 | 0.447 | 0.685 | 0.128 |
| | (0.123) | (0.052)* | (0.059) | (0.041)** |
| ***Constant*** | -0.839 | -0.928 | 2.789 | 3.440 |
| | (0.198)* | (0.221)* | (1.817) | (1.801)*** |
| ***Lerner*** | 0.077 | 0.165 | -2.569 | -0.128 |
| | (0.054)*** | (0.068)** | (0.803)* | (0.041)* |
| ***CAR*** | 0.037 | 0.004 | -0.035 | -0.005 |
| | (0.001)** | (0.009)* | (0.014)* | (0.007)** |
| ***ROA*** | 0.012 | -0.008 | -0.598 | -0.557 |
| | (0.009) | (0.003) | (0.138)** | (0.032) |
| ***Size*** | 0.064 | 0.0519 | -0.024 | -0.062 |
| | (0.010)* | (0.011) | (0.117)** | (0.090)* |
| ***Cycle*** | 0.066 | 0.005 | -0.188 | -0.039 |
| | (0.002)** | (0.004)*** | (0.053)* | (1.801)*** |
| ***F- Stat*** | 24.96* | 3.81* | 97.18* | 13.59* |
| | | | | |
| $R^2$ ***Within*** | | 0.426 | | 0.608 |
| ***Between*** | | 0.742 | | 0.868 |
| ***Overall*** | | 0.561 | | 0.704 |
| ***AR2 Test*** | -0.33 | | -0.17 | |
| ***(P-Value)*** | (0.742) | | (0.85) | |
| ***Hansen J Test*** | 19.28 | | 21.22 | |
| ***(P-Value)*** | (0.38) | | (0.19) | |

**, ** and *** indicates statistical significance at 1, 5 and 10% levels respectively. Robust standard errors are reported in parenthesis*

Finally, the estimated specifications exhibit strong goodness of fit as all of the estimated F-statistics are highly significant. Similarly, AR2 test indicates that second order correlations among first differenced errors do not exist in our estimated models. Similarly, the Hansen J-statistics is also found to be insignificant indicating that the identifying restrictions are valid.

## Discussion

Given the unique services provided by the banks, soundness and stability concerns were always at the center of banking policy debates (Danisman & Demirel, 2018). In the banking literature, the tradeoff between competition and stability has resulted in two opposing views. The one advanced by (Keeley, 1990) is commonly known as the competition fragility view, which has drawn major support in the literature. On the other hand, a relatively new body of literature supports the competition stability view advanced by (Boyd & De Nicolo, 2005). Given these opposing predictions, in this study, we tested the two views for Pakistani banking industry. Specifically; *first,* we investigated the link between competition and financial stability. *Second,* unlike previous studies, we do so by a direct measure of market power; the Lerner Index, rather than relying on other indirect measures such as concentration ratios. *Third,* we introduce capitalization ratio as a determinant of banks' risk and tested for whether holding higher capital buffers enhance stability indicators for Pakistani banks. Using a relatively recent annual data set (2004 to most recent 2017, a period characterized by extensive and sweeping regulatory changes, consolidations and other market pressures that could potentially alter the competitive landscape and condition banks' behavior), for an unbalanced panel of 30 banks, we used dynamic panel data analysis techniques of two step system GMM. Our findings could be summarized as follows.

The Lerner index for market power reveals that monopolistic conditions prevail in Pakistani banking industry. These dynamics could be attributed to the increased concentration and recent wave of amalgamations in the industry commensurate with the too big to fail sentiment and can have profound implications[4] as it can potentially lead to collusive practices among others (Bos et al., 2013). These findings are in contrast to (Khan & Hanif, 2017a, 2017b, 2017c; Mirza et al., 2016) who found perfect competition in the case of Pakistan utilizing

[4] Recently the central bank of Pakistan designated three domestic banks to be systemically important.

various measures of competition. However, our findings are consistent with (Bikker et al., 2007; Claessens & Laeven, 2004; Khan & Riazuddin, 2009).

Subsequently, we tried to find out the effects of market power on risk measures including liquidity and default risk indicators. Our findings render support towards the competition stability paradigm of (Boyd & De Nicolo, 2005) in both cases. Suggesting that infusing further competition will lead to enhanced stability in the banking industry. These findings are consistent with (Demsetz et al., 1996; Salas & Saurina, 2003; Bofondi & Gobbi, 2003; Beck et al., 2006; Berger et al., 2009; Ariss, 2010b; Agoraki, Delis, & Pasiouras, 2011; Beck et al., 2013; Forssbaeck & Shehzad, 2015;) among others.

Finally, we introduced capital requirements as a determinant of risk and find evidence in favor that higher capital buffers make the banks more risk averse ( Keeley, 1990; Allen & Gale, 2000; Hellmann et al., 2000; Ghosh, 2009; Sarkar et al., 2016). This further imply that higher capitalization ratios should be encouraged.

## Conclusions

Given that, competition stability nexus has been established in the case of Pakistan. This essentially implies that at policy level, infusing greater competition may break the monopoly power and may lead to higher stability. Our results support this view to improve the competitive conditions of banking industry by and large. In addition, we suggest to mediate the tradeoff between competition stability and or fragility with regulatory tools such as capital requirements which is found to be strongly associated with risk exposure of banks. This essentially imply that as banks will have greater capital buffer, there will be lesser stability concerns.

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