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Mahmood ul Hasan Khan

Muhammad Nadim Hanif

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Mahmood ul Hasan Khan, Monetary Policy Department, State Bank of Pakistan, Karachi

Muhammad Nadim Hanif, Research Department, State Bank of Pakistan, Karachi

Abstract

Based upon the indicators of market structure, this paper tests the relevance of Structure-Conduct-Performance (SCP), Relative Market Power (RMP), and the Efficient Structure (ES) paradigms for banking industry of Pakistan. We use a (balanced) panel data from 24 commercial banks of Pakistan from the year 1996 to 2015. Descriptive statistics and the formal tests suggest that: (a) there is a weak association between the indicators of market structure and banks' performance in case of Pakistan; (b) the empirical evaluation results do not provide meaningful support to SCP or RMP paradigms; and (c) the ES paradigm is more relevant in case of Pakistan. At policy level, the findings of this paper suggest that the focus of policymakers should be to improve the efficiency of banking sector, as the excessive focus on indicators of market structure like concentration ratio to improve competition in the banking sector could be counterproductive.

Keywords: Structure-Conduct-Performance, Efficient-Structure, Competition, Banking Sector
JEL Classification Codes: D40, E50

Contact for correspondence:
Mahmood ul Hassan Khan
Lead Economist, Monetary Policy Department
State Bank of Pakistan
I.I. Chundrigar Road
Karachi 74000, Pakistan.
Email: mahmood.khan@sbp.org.pk

Non Technical Summary

To provide an unambiguous interpretation to changes in market structure indicators (like concentration ratio and Herfindahl-Hirschman Index) in the context of banking competition, this study explicitly tests the relevance of Structure-Conduct-Performance (SCP), Relative Market Power (RMP), and the Efficient Structure (ES) paradigms for the banking sector of Pakistan.

The study estimates four different variants of reduced-form profit function by using a balanced panel data of 24 commercial banks from the year 1996 to 2015. Relevant panel data analysis techniques are also utilized to account for huge variation in bank size and changes in bank-specific factors over time. In addition, different specifications of the model are used to deal with strong association among the explanatory variables and to evaluate the robustness of key findings.

Descriptive analysis of data and the formal tests of hypotheses suggest that: (a) there is a weak association between the indicators of market structure and banks' performance in case of Pakistan; (b) the results from formal tests of hypotheses do not provide meaningful support to SCP or RMP paradigms; and (c) the ES paradigm is more relevant in case of Pakistan. Specifically, indicators of cost efficiency play a statistically significant role in determining profitability of banks as we failed to accept the null hypothesis of no impact of efficiency indicators in case of both individual and joint restrictions on the parameters of interest.

At policy level, the results suggest that the policymakers should focus on improving the efficiency of banking sector as there are already more than enough numbers of players to create a healthy competition in the banking arena. Excessive focus on traditional indicators of market structure like concentration ratio or HHI to improve competition in the banking sector could be counterproductive as it may entail efficiency losses to banks.

1. Introduction

Broad-based financial sector reforms initiated in the early 1990s paved the way for the privatization of government owned commercial banks and strengthened the role of private sector. These reforms promoted competition by creating a level playing field for all the market players; implementing a market based monetary management; and liberalizing the credit market by abolishing directed credit schemes and eliminating cap on lending rates. Moreover, pertinent supervisory and regulatory framework was also strengthened to support the growing role of the private sector (in line with international best practices), and an auction based system for the sale of the government securities was developed.

It is well documented in the literature that structural characteristics of the banking sector of Pakistan have witnessed significant changes since the inception of financial sector reforms (Hanif, 2003). Different measures of concentration (namely concentration ratio, and Herfindahl-Hirschman Index) provide ample evidence that the market structure of the banking sector has significantly improved towards a competitive environment (SBP 2003 and 2006; Khan, 2009). Not only number of banks operating in Pakistan has increased considerably, but the big five banks have also lost their market share to the second tier private sector banks. How these changes have impacted the performance and competition in the banking sector is an open question.

Literature on exploring links between the market structure and competition in the banking sector indicates that the changes in the concentration ratios (or market structure) could broadly be interpreted in the context of either Structure-Conduct-Performance (SCP) or Relative Market Power (RMP) paradigm, and/or in relation to the Efficient Structure (ES) hypothesis. These hypotheses provide competing explanations for the changes in the concentration ratio. The proponents of SCP approach argue that high degree of concentration impairs competition, which facilitates banks to extract abnormal profits by exercising their market power [Mason (1939), Stigler (1964), Clark (1986), Arby (2003), Sathye (2005), Samad (2008), and Al-Muharrami and Matthews (2009)]. Moreover, the traditional theory of industrial organization suggests that small number of banks in a country encourages collusive behavior by reducing the cost of coordination, and subsequent implementation of the agreement. In other words, SCP paradigm implies a positive association between profitability and concentration in the banking sector. At policy level, SCP paradigm recommends the use of anti-concentration policies to rein in the market power and promote competition in the banking sector.

The concept of Relative Market Power (RMP), which is a special case of SCP paradigm, is also used to explain the conduct and the performance of the banks. Rhoades (1997) coined the term RMP based on the work of Shepherd (1972) by arguing that higher market share helps profitability by allowing big institutions to benefit from the economies of scale and the efficient use of its resources. Like SCP, the RMP also predicts a positive correlation between the market share and profitability, but due to slightly different reason. Both the SCP and RMP assume one-way causation from the market structure to the performance or competition in the banking sector.

In contrast to SCP or RMP paradigms, the proponents of ES hypothesis argue that the efficient banks benefit from the competitive environment, and grow at a higher pace as compared to their peers. As a result, market share of the efficient banks increases over time, which ultimately contributes towards market concentration (Demsetz, 1973). Like SCP approach, it also implies that there should be a positive association between the efficiency (profitability) and concentration in the banking sector,

while the pass-through mechanism is opposite to the SCP approach. The policy prescription based on ES hypothesis also points towards opposite direction, as the anti-concentration policies suggested by SCP paradigm would impair the efficiency of the banking sector by distorting the competitive environment.

Given the competing interpretation of changes in the market structure, it is, therefore, imperative for the policy makers to understand the links between the market structure and the performance of banking sector in the context of both SCP and ES paradigms. This study is aimed at evaluating both the paradigms in case of Pakistani banking sector by using balanced panel data from the year 1996 to 2015. Moreover, the efforts are also exerted to overcome a number of definitional issues related to the empirical definition of the various indicators by using detailed data on banks' balance sheets and income statements.

The paper is organized into seven sections. Introduction in the section 1 is followed by a brief review of literature in the section 2. Section 3 elaborates the methodology used to test the relevance of both SCP and ES paradigms. The data collection and definitional issues related to construction of different variables is the subject of section 4. Descriptive analysis of the data is provided in section 5, which is followed by estimation and interpretation of empirical results in section 6. The final section concludes the paper.

2. Review of Literature

Given the strong theoretical underpinnings of both SCP and ES hypotheses, researchers have attempted to explore these hypotheses extensively. This led to huge literature on the subject as the empirical findings continued to differ from one study to another, primarily due to: (a) differences in methodology; (b) period of study or estimation period; (c) definitional issues; and (d) country-specific factors. In addition, while a number of studies based their analysis on cross-country data to test the validity of these hypotheses, a large number of studies focused on a single country, assigning greater role to country specific factors. In these settings, following studies on the subject are worth noting.

Goldberg and Rai (1996) explored the links between concentration and profitability in the context of the SCP. The authors used bank-wise data from 11 European countries from 1988 to 1991 to estimate a reduced form profit function, and two additional equations to model the market power in context of ES paradigm. The results support one of the two versions of ES hypothesis over the estimation period, while the results do not support the positive relationship between the market structure and profitability as envisaged by SCP paradigm.

The results of Chortareas et al (2007) also support the findings of Goldberg and Rai (1996). The authors estimated a profit function by using data of 3000 banks ranging from 1997 to 2005, from 10 largest Latin American countries. The results highlight that the market concentration loses its significance in the presence of technical and scale efficiency in the profit function. The authors concluded that there is no evidence of using market power for collusive behavior.

In contrast to above study, Mirzaei et al. (2011) used bank level data of 40 (emerging and advanced) economies from the year 1999 to 2008, to explore the impact of market power on the performance (profitability) and stability of banks. The authors estimated a profit function specified under SCP paradigm. Specifically, profitability of banks (proxied by average returns on assets, and returns on equity) was regressed on a number of country-specific, bank-specific, and market structure indicators

to disentangle the impact of the market power. The results suggest that "a greater market power leads to high bank performance" especially in advanced economies. On the other hand, the results do not support any paradigm (SCP or ES) in case of emerging countries.

Given the inconclusive evidence from cross country studies, now we turn to country specific studies, which weigh in country specific factors. Park and Weber (2006) tested the SCP hypothesis against the ES hypothesis by using panel data of Korean banks from the year 1992 to 2002. The results supported the ES hypothesis, as the efficiency measures significantly impact the profitability of Korean banks. Similarly, Samad (2008) tested the validity of SCP and ES hypotheses by using pooled data of Bangladeshi banks from the year 1999 to 2002. The results indicate that changes in the market structure of Bangladeshi banks could be explained in the context of ES paradigm. However, the results involve a good degree of uncertainty as the author himself noted that the issue should be explored further from a policy point of view.

Mensi and Zouari (2011) investigated SCP hypothesis by using panel data comprising 10 Tunisian banks from the year 1990 to 2005. The results suggested that market structure of Tunisian banking sector could be explained within the context of RMP hypothesis. On the other hand, the results did not support the presence of SCP and ES hypotheses. The author concluded that "Tunisian banks do not exert a monopoly power entailing the exploitation of customers, yet they are able to extend their market share and generate profits - thanks to a diversification of products".

Tetsushi et al. (2012) investigated relationship between banks' growth and the efficiency, which can be termed as a direct test of ES hypothesis. The authors used annual data of 26 Japanese banks from the year 1997 to 2005 to estimate both growth and efficiency functions of banks. The results indicated that the efficient banks grew at a faster rate relative to other banks, which supported the intuition of ES hypothesis.

Above studies clearly show that the empirical results continued to differ from one country to another. Similar is the outcome of past studies conducted in case of Pakistan. For example, Arby (2003) analyzed the structure and performance of Pakistani banks under the SCP paradigm. The author estimated a profit function by using panel data of 36 banks in Pakistan from the year 1990 to 2000. The results indicated that loans and capital to asset ratios positively impacted the profitability of banks. The author also concluded the absence of competitive environment in its true spirit. It is interesting to note that the findings related to competitive environment, were entirely based on indicators of inequality (concentration). The study provided no clue on the underlying factors impacting the behavior of inequality indicators. Moreover, although the analysis was carried out under SCP paradigm, none of the inequality (structural) indicators was included in the profit function.

In contrast to Arby (2003), Bhatti and Hussain (2010) analyzed the impact of market structure upon the profitability of banking system in Pakistan by using panel data of 20 commercial banks from the year 1996 to 2004. The authors based their analysis on both the SCP and ES hypotheses. The results indicated that the profitability of banks was positively affected by the concentration in the banking system. However, their results did not support the ES hypothesis over the estimation period. At best, the result remained inconclusive.

In the context of above discussion, our paper contributes to existing literature in three ways. First, we explicitly analyze the links between the performance and the market structure of the banking sector of Pakistan. Second, the estimation is based on the most recent and the longest panel data of the banking

sector of Pakistan (for the year 1996-2015). And thirdly, detailed information from the banks' annual audited accounts allowed refining the empirical definition of various indicators used for empirical analysis.

3. Methodology

Following literature on the industrial organization, the traditional SCP hypothesis seems to be a good starting point for the empirical analysis. In fact, this appears to be quite relevant as the banking sector of Pakistan gradually moved from a point of high concentration towards a competitive market structure. Prior to the initiation of financial sector reforms in 1990, the banking sector of Pakistan was characterized by lack of competition, high concentration, inefficiency, political lending, lack of proper regulations and weak supervisory framework etc. (SBP, 2000). In other words, ES explanation seems to be less likely the case, especially in the pre-reform era. However, it seems quite relevant in the post reform period, as a number of newly established banks progressed to the second tier banks. Specifically, these banks have increased their market share in the recent past, while the big five banks were on the losing end.

In this backdrop, we initiate the exploratory work in the context of SCP paradigm, which postulates that profitability (π) of a bank depends on the market structure. Mathematically, it can be written as follows:

$$\pi = f(Market\ Structure)$$

In practice, market structure could be proxied by a measure of concentration (i.e. concentration ratio (CR) or HHI). Therefore, above functional form can be re-written as follows:

$$\pi = f(CR)$$

While the CR captures the potential impact of collusive behavior that facilitates banks to earn abnormal profits, market share (MS) could be included to explore the relative market power of the banks. This will expand the general functional form as below:

$$\pi = f(CR, MS)$$

In the next step, we expand the above functional form to take into account the measures of efficiency (EF), which would facilitate the test of ES hypothesis (Doyran, 2013). Mathematically, above functional form can be modified as below.

$$\pi = f(CR, MS, EF)$$

In addition, we also need to control for bank-specific factors (say Z), which directly impact the profitability of banks. As a result, the profit function is extended further as follows.

$$\pi = f(CR, MS, EF, Z)$$

Finally, we have to decide the functional form of this general specification. Following Samad (2008), Mirzaei and Moore (2014), and Doyran (2013), we use a well known reduced form of the profitability equation given below.

$$\pi_{it} = \beta_0 + \beta_1 CR_t + \beta_2 MS_{it} + \beta_3 EF_{it} + \sum_{j=0}^{K} \gamma_j Z_j + \varepsilon_{it}$$

In above regression, if $\beta_1 > 0$ and $\beta_2 = \beta_3 = 0$, it implies that the traditional SCP holds as it shows that the market concentration positively impacts the profitability of the banking sector. In literature, test of these restrictions is also interpreted as "pure collusion hypothesis" (Mensi and Zouari, 2011). On the other hand, if $\beta_1 = \beta_2 = 0$ and $\beta_3 > 0$, it indicates that efficient banks enjoy higher profitability in the banking sector of Pakistan. In other words, this test would support the idea of ES hypothesis. Finally, a test of $\beta_1 = \beta_3 = 0$ and $\beta_2 > 0$ suggests that banks with relatively higher market share, as compared to their peers, are more profitable. This result would support the RMP paradigm. Moreover, this result would also indirectly support the idea of ES hypothesis, as the efficient banks will grow faster as compared to their peers, which will increase their market share.

4. Data and Estimation

We used balanced panel data of 24 Pakistani banks from the year 1996 to 2015 to estimate the regression specified in the previous section. Given the fact that there are various ways to define different indicators of banks' performance, market power and efficiency, we used the following definitions to proxy the variables of interest.

Profitability: In practice, the bank's profitability is primarily measured by average return on assets (ROA). It is defined as the ratio of bank's profit before tax to average of assets at the beginning and at the end of the year. Another measure of profitability, which is widely used from investors' point of view, is the return on equity (ROE): a ratio of profit before tax to average equity of the bank. [1] In this study, we used both ROA and ROE before tax (denoted by ROABT and ROEBT respectively).

Concentration: Although there are various measures of concentration in the literature, we rely on the concentration ratio (CR) and the HHI for the estimation of our model. Use of more than one measure of market structure would help analyze the robustness of results.

Market share: Market share is calculated as share of a bank's assets in total assets of the banking system. A key issue in this context was whether to use the total assets of 24 banks included in our sample or the overall assets of the banking system of Pakistan. We used overall assets as it ensures that the market share of bank i is influenced by the changes in the assets of all other banks operating in the country.

Efficiency: it is not directly observable, and is a relative concept, i.e., a comparison of desired with actual performance; or a comparison of one bank with another bank. In literature, efficiency is discussed in different contexts like technical (or physical) efficiency, allocative efficiency, cost efficiency, etc. Moreover, there is no consensus on how to measure efficiency. Both the direct and indirect measures of efficiency are widely used in the literature. As the focus of this paper is to test the validity of SCP and ES hypotheses, not to rank banks in term of their efficiency per se, we rely on an indirect measure of efficiency. Following Samad (2008), and Mirzaei et al. (2011), cost efficiency of banks is proxied by a ratio of administrative cost to average asset. Moreover, (log of) bank's total

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[1] Another variation of both ROA and ROE could be calculated by using profit after tax, while keeping the denominators unchanged. Taxation on banking industry is determined by the Government of Pakistan, and all banks face the same taxation system. It is therefore important to exclude the taxation liabilities to understand the competitive behavior of banks.

assets is also used to analyze the economies of scale (i.e. scale efficiency) in the banking sector of Pakistan.

Control variables: We also used a number of bank-specific variables to control for the impact of banks' portfolio, capitalization, funding structure etc. on the bank's profitability. Specifically, these factors include (i) the share of non-performing loans to gross loans (to take into account the infection in banks' asset portfolio), (ii) share of non-remunerative deposits to total deposits (to account for the impact of access to low cost of funding), (iii) ratio of equity to average assets (to gauge bank's capitalization), (iv) share of earning assets in total assets (as a measure of productive assets), and (v) net interest margin (to take account of the banking spreads).

5. Descriptive Analysis

Before estimating the regression specified in the methodology section, it is worth exploring to check correlation among various indicators of banking competition, performance and the market structure. Table 1 shows the descriptive statistics of key variables used. This summary table shows a wide variation in each variable over the estimation period. Although variation in data is the key to empirical studies, excessive variation may undermine the presence of causal links among the variables. Following points related to the distributional aspect of the variables are worth discussion.

Table 1: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.
Return on assets (ROA)	1.3	9.4	-19.1	2.6
Return on equity (ROE)	12.4	244.6	-862.0	62.2
Non-performing loans to total loans (NPL)	13.0	95.5	0.1	13.8
Share of non-remunerative deposits (SNRD)	25.6	84.0	0.3	12.8
Earning assets to total asset ratio (EATTAR)	0.8	0.9	0.3	0.1
Equity to average asset ratio (EQTTAR)	0.1	0.6	-0.2	0.1
Admin expense to asset ratio (ADETAR)	2.8	7.9	0.0	1.2
Log of total assets (LTA)	11.0	14.6	6.1	1.8
Net interest margin (NIM)	3.7	20.1	-4.4	2.1
HHI	0.1	0.1	0.1	0.0
Concentration ratio (CR)	56.8	65.0	50.9	5.1
Market share (MS)	3.8	23.8	0.0	4.9

ROA varies from negative 19.1 to positive 9.4 percent in our sample (Table 1). These extreme values of ROA could be attributable to one-off factors like strong provisioning requirement during a year due to sudden jump in (or recognition of old) non-performing loans, which itself could be driven by factors like floods etc. On a positive side, it could be the windfall gains from a strategic investment, or other positive shocks. These extreme values would be difficult to explain through bank-specific, industry-specific, or some other variables, which systematically impact the profitability of banks. The similar is the case for return on equity (ROE). However, it is encouraging to note that such values are generally related to small sized banks.

Net interest margin (NIM) ranges from negative 4.4 to positive 20.1 percent (Table 1). Detailed analysis indicates that there are only 14 of 480 observations (2.9 percent of our data), which are less than zero. Moreover, these values pertain to a small foreign bank, which is operating in a branch mode. On the other hand, only 2 observations in our data set have the value of NIM greater than 10 percent, which reflects that there is hardly any bank which enjoys substantially higher NIM. However, 108 of 480 observations (22.5 percent of the data) indicate NIM of greater than 5 percent. This could be one of the reasons that banking sector of Pakistan is generally characterized by high spreads.

The magnitude of NPLs varies from 0.1 to 95.9 percent. Around 14 percent of observations in our data are greater than 25 percent, which reflects significant incidence of NPLs. This could be one of the contributory factors towards higher NIM, as provisioning against NPLs is an expense for a bank.

Admin expense to average asset ratio (ADETAR) varies from almost zero percent to 7.9 percent, with an average of 2.8 percent. There are only 74 observations (15.4 percent) in ADETAR data with the ratio higher than 4 percent. In literature, this indicator is used as a measure of efficiency or as a cost of intermediation.

In addition to descriptive statistics, the pair-wise correlation coefficients among the variables (to be used in regression analysis) provide valuable insights, especially related to the multicollinearity. The values of correlation coefficients among the variables shown in Table 2 indicate that the concentration ratio CR and HHI are highly correlated with each other. It implies that we cannot use both CR and HHI in a single regression. Moreover, the log total assets (a scale variable) have slightly higher correlation with HHI, CR and market share. This is understandable, as three measures of concentration are derived from banks' assets. Besides this, none of the variables points towards multicollinearity, and all the correlation coefficients have expected signs. For example, NPL is negatively correlated both with the ROA and ROE. This is in line with the expectation as the increase in NPLs will undermine the profitability of the banking sector because: (a) NPLs reduces the earning assets of the banking sector, which ultimately negatively impacts the banks' interest earning; and (b) provision against NPL is an expense for the banks.

All indicators of market structure are positively correlated with both ROA and ROE. It implies that higher concentration is positively associated with banks' profitability as predicted by both SCP and ES hypotheses. Similarly, the market share is also positively associated with banks' profitability. Both SCP and ES hypotheses postulate a positive association between ROA and MS. In the next section we analyze which of these hypotheses explain the positive association (between ROA and MS) in case of Pakistan.

Table 2: Correlation Coefficients

	ROABT	ROEBT	NPL	SNRD	EATAR	EQTAR	ADETAR	LTA	NIM	HHI	CR	MS
ROABT	1.0000											
ROEBT	0.4725	1.0000										
	11.4219											
NPL	-0.4171	-0.2597	1.0000									
	-9.7785	-5.7302										
SNRD	0.1657	0.1191	0.1621	1.0000								
	3.5793	2.5568	3.4998									
EATTAR	0.0980	0.0876	-0.0164	0.0225	1.0000							
	2.0979	1.8728	-0.3495	0.4789								
EQTTAR	0.1086	-0.0054	-0.0937	-0.0954	-0.5343	1.0000						
	2.3278	-0.1156	-2.0051	-2.0418	-13.4674							
ADETAR	-0.3224	-0.1484	0.1513	0.1477	-0.1450	0.0798	1.0000					
	-7.2560	-3.1982	3.2604	3.1827	-3.1215	1.7068						
LTA	0.0961	0.0791	-0.0996	0.0299	0.4471	-0.3767	-0.0584	1.0000				
	2.0564	1.6918	-2.1318	0.6368	10.6506	-8.6660	-1.2474					
NIM	0.4815	0.2267	-0.1919	0.1349	-0.0277	0.0734	0.1789	0.1995	1.0000			
	11.7072	4.9595	-4.1655	2.9004	-0.5903	1.5678	3.8738	4.3390				
HHI	0.0117	0.0186	0.0539	0.1702	-0.2824	-0.2214	-0.1287	-0.5099	-0.1726	1.0000		
	0.2501	0.3962	1.1495	3.6808	-6.2727	-4.8367	-2.7645	-12.6290	-3.7327			
CR	0.0148	0.0138	0.0510	0.1632	-0.2764	-0.2123	-0.1300	-0.5058	-0.1650	0.9936	1.0000	
	0.3145	0.2950	1.0880	3.5247	-6.1281	-4.6279	-2.7946	-12.4944	-3.5654	187.260		
MS	0.0857	0.0787	0.0659	0.1481	0.1178	-0.2910	-0.0521	0.6767	0.2052	-0.0011	-0.0008	1.0000
	1.8336	1.6828	1.4066	3.1899	2.5279	-6.4799	-1.1126	19.5821	4.4679	-0.0242	-0.0173	

Values beneath the correlation coefficients are t-statistics.

6. Estimation and Empirical Findings

Regression equation specified in the methodology section is estimated by using fixed effects model. The GLS estimates are obtained by using cross-section weights as the residual variance for each bank will be different due to huge variation in bank-size.[2] Similarly, cross-section weights are also used to estimate adjusted standard errors of the parameters to account for the heteroskedasticity.

Cognizant of strong association between HHI and CR, we estimated separate regressions for both CR and HHI. Moreover, there is a strong correlation between the market share and overall assets of banks as the former variable is derived from the bank assets. However, both variables are included in regression to test the validity of SCP and ES hypothesis, as the total assets are included to analyze the impact of economies of scale (efficiency), while the market share captures the impact of market power. Overall, we estimated 4 different versions (Model 1 to Model 4) and results are reported in Table 3.

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[2] As of 31st December 2015, total assets of the biggest bank were 666 times the total assets of the smallest bank. It implies residual variance of these banks would also be substantially different. It is therefore necessary to account for this heteroskedasticity by using residual variance of each bank as weight.

Table 3:Parameter Estimates

	ROA				ROE			
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
C	-0.398	-0.141	1.574	0.449	13.289	0.447	15.296	0.422
NPL	-0.069	-5.578	-0.069	-5.539	-0.656	-5.022	-0.649	-4.984
SNRD	0.021	2.668	0.021	2.789	0.205	2.426	0.207	2.437
EATTAR	4.030	3.798	3.953	3.587	43.095	3.546	43.787	3.681
ADETAR	-0.926	-10.683	-0.935	-10.732	-6.986	-6.479	-7.079	-6.522
LOG(TA)	0.000	-0.001	-0.097	-0.605	-3.263	-2.141	-3.650	-2.531
NIM					4.014	7.775	4.023	8.045
EQTTAR	9.072	5.019	8.254	4.636				
HHI	8.677	0.641			99.871	0.723		
CR			-0.001	-0.021			0.179	0.508
MS	-0.082	-2.188	-0.072	-1.897	0.115	0.248	0.174	0.409
Adjusted R Sq	0.650		0.650		0.692		0.688	
SE of regression	1.944		1.944		51.796		51.555	

Diagnostics of estimated regression equations indicate that the models are well-specified: (a) around 65 percent variation in ROA is explained by the factors included in regression equation, (b) standard error of regression is not only on lower side, but also remained largely unchanged across the different specifications for ROA and (c) estimated coefficient of key indicators largely remained unchanged across different specifications, indicating the robustness/stability of the results. The same is the case for ROE equation: explanatory power is even higher than the estimated ROA equation and there is no visible change in results across both specifications for ROE.

Looking at the parameter estimates in Table 3 we see that the coefficient of admin expenses to average assets (ADETAR) is statistically significant in all the four regressions. Being a proxy for cost efficiency, it implies that the cost efficient banks enjoy higher profitability. Moreover, the coefficient of scale variable (log of total assets- LTA) is also statistically significant for two of four regressions, providing the weak evidence in favor of scale efficiency as well. A Wald test of zero restrictions on the coefficients of ADETAR and LTA (which implies no cost and scale efficiency) got rejected in all four specifications (Table 4). This suggests that both cost and scale efficiency play an important role in determining the profitability of banks in Pakistan.

The results also indicate that parameter estimates of both the HHI and the CR are statistically insignificant across all the specification. These results do not support the traditional SCP paradigm in case of Pakistan's banking sector, as the concentration has no statistically significant impact on banks' profitability over the estimation period. These results are in sharp contrast to the findings of Bhatti and Hussain (2010) according to which a positive relationship exists between commercial bank profitability and concentration for the case of Pakistan. However, our findings are in line with the analysis based on simple correlation coefficients presented in the earlier section.

The coefficient of market share (MS) is statistically significant in only one of four regressions at conventional level of significance. The negative coefficient of MS implies that higher market share is

associated with low banks' profit over the estimation period. This result is in contrast to the positive association envisaged in RMP paradigm. In our view, this result should be interpreted with caution as the big five banks have been losing their market share to second tier banks in the country over the estimation period. This might have concealed the positive effect of the market power on banks' profitability.

Table 4: Results of Wald Test

Restrictions	Model 1	Model 2	Model 3	Model 4
Coefficient of ADETAR = Coefficient of LTA=0	63.99*	67.72*	21.78*	23.34*
Coefficient of HHI = Coefficient of MS=0	2.52	2.48	0.62	0.44

*: Significant at 1 percent

A joint test of zero restrictions on the parameter estimates of concentration and market power variables suggest failure to reject the null hypothesis in all four regressions at 1 percent level of significance (Table 4). These results do not support either SCP or RMP paradigms.

7. Conclusion

Given the sound theoretical backing for both the SCP and ES paradigms, this study explicitly evaluates the relevance of these paradigms in case of banking sector of Pakistan. We used balanced panel data of 24 commercial banks operating in Pakistan from the year 1996 to 2015. The descriptive analysis of data and the formal tests of hypothesis suggest that: (a) there is a weak association between the indicators of market structure and banks' performance in case of Pakistan; (b) formal tests of hypotheses do not provide meaningful support to SCP or RMP paradigms; and (c) the ES paradigm is more relevant in case of Pakistan. Indicators of cost efficiency play a statistically significant role in determining profitability of banks.

At policy level, the results suggest that the focus of policy makers should be to improve the efficiency of banking sector. Excessive focus on the traditional indicators of market structure like concentration ratio or HHI to improve competition in the banking sector could be counterproductive. As we observed in the discussion on market structure, the big five banks are losing their market share to second tier private sector banks. It implies that these banks are unable to use their market power or potential economies of scale to expand their banking business. Given the more than 50 percent share of big five banks in total assets of the banking sector, the relatively poor performance of these banks (compared to the mid-sized private banks) could partially conceal the impact of market power on banking business.

The findings of this study have important implications for the analysis of banking competition in case of Pakistan. Specifically, the results in this study provide ample evidence that market structure indicators cannot be unambiguously used for exploring competition in the banking sector of Pakistan. It is therefore necessary to employ formal tests e.g. PR-H statistic designed to analyze competition, which are primarily aimed at exploring the conduct (or behavior) of market player to analyze the underlying competitive environment.

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