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Competition in the Banking Sector of Pakistan: Evidence from Unscaled and Scaled Revenue Equations[1]

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The objective of this paper is to empirically analyze the competition in the banking sector of Pakistan spanning the period 1995-2014. Two decades ago, banking sector reforms were initiated and implemented in Pakistan to spur competition in the banking sector. To examine competition, augmented Panzar and Rosse unscaled and scaled revenue equations is estimated by controlling risk and size of banks using balanced panel data of 22 commercial. Results are robust and reveal that the commercial banks in Pakistan generate revenues in the environment of monopolistic competition and this reflects the positive impact of banking sector reforms in creation of competition among banks.

Key words: Banking sector reforms; Market structure; Monopolistic Competition; Panzar and Rosse test; Panel data

Jel Classification: G20, G21, C23, L10

1. Introduction

Competition is at the heart of the banking industry because any type of non- competitive behavior has persistent adverse impact on productive efficiency, consumer social welfare and economic growth. Indeed, competition in the banking sector matters for the household and business sector to access the financial goods and services. At micro level, household and firms make transaction with banks for deposits, loans and other services while at the macro level banks mobilize savings from savors to investors and playing a vital role in the transmission mechanism of monetary policy and payment system (Goddard and Wilson, 2009).

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Like other industrial and developing countries, since 1989 the banking sector of Pakistan has also undergone privatization and restructuring process to create more sophisticated banking system. The prime purpose of the financial restructuring[4] was to stimulate the competition in the banking sector by privatizing state-owned banks and mitigating the barriers for the entry of private and foreign banks, easing branch policy and interest rate liberalization. These have significant impact on efficiency, productivity of banks and also on economic growth. Indeed, more competitive, stable, and well capitalized banking sector would channel savings to the more productive projects to facilitate growth process. A number of studies have established a strong link between competition and economic growth (Levine et al., 2000; Bikker et al., 2012). The instrumental role of banks in the economy makes the competition in the banking sector an important issue. Therefore the objective of this paper is to examine the degree of competition in the banking sector of Pakistan. Many previous studies have investigated the competition in the banking sector and its specific structure such as perfect competition, monopoly, monopolistic competition and oligopoly (Apergis et al., 2016; Barros and Mendis, 2016; Bikker et al., 2012; Matthews et al., 2007; Al-Muharrami et al, 2006; Staikouras et al., 2006; Bochs and Mathisen, 2005; Gelos and Roldos et al., 2004; Coccorese et al., 2004; Neath and Neave, 1989), but in Pakistan little attention has been paid on this area. Majority of the studies find that banking sector is monopolistically competitive in developing and developed countries. This implies that banks compete with each other by offering differentiated products to customers and hence banks are price taker due to large number of banks or producers in the market. Therefore none of the bank is able to set its own price due to its limited control over final price (Apergis et al., 2016). Practically knowledge of monopolistic competition is very important for policy makers and managers. Low entry barrier may affect the managerial decisions towards strategic alliance and merger and acquisition of banks. Similarly monopolistic competition forces the managers to diversify their products and assets to expend their sources of revenues.

Theory suggests that the competition in the banking sector prevails if markup of price is greater than marginal cost (Lerner, 1934). It is very

[4] Levine (1997) mentions that financial development is the true predictor of future rate of growth and development, capital accumulation and technological innovations.

hard to apply this theory in banking sector where it is difficult to get information on cost and price of banking products. Therefore, structural and non-structural methods are used to assess the competition in the banking market (Bakker and Haaf, 2000). Structural methods consist of structural conduct performance (SCP) hypothesis and efficient structure hypothesis (ESH)[5]. These methods imply that more concentrated banking sector is more collusive. Herfindahl Hirchman index is used to measure competition in the market and it is a very poor measure of competition (Bikker et al, 2012).

Two non-structural models of competitive behavior are used within New Empirical Industrial Organization framework (Bresnahan, 1982; Panzar and Rosse, 1987). But here we focus on Panzar and Rosse (1987) model which is widely used for the empirical analysis of market competition in the banking industry. Panzar and Rosse construct competitive indicator known as 'H' statistic which provides quantitative assessment about the nature of competitive prevails in banking sector and it is calculated by summing up the coefficients of factor input prices in total revenue equation. If $H < 0$ then this represents that banks are earning revenues in monopoly environment. This happens because monopolist faces negatively sloped demand curve which has price elasticity greater than unity. If $0 < H < 1$, banks are working in monopolistically competitive environment. Banks attain the equilibrium at Chamberlin (1933) tangency solution that Individual bank maximizes the profit, where MR = MC and P = AR=AC, as in the case of monopoly. Entry and exit of the banks take place until the banking industry achieve zero economic profit and price is equal to average cost (AC) of each bank. If $H = 1$, , then

[5] Mason (1939) and Bain (1951) introduce the SCP paradigm to measure the competition in the banking industry by establishing link from industry performance to individual firm or bank performance and from bank performance to industry performance. They argue that if the industry is highly concentrated, more monopolistic profit is earned by charging higher prices for products subject to that banks in the industry ignore the potential competitors due to entry barriers of the firm in the industry. Therefore positive relationship exists between market concentration and profitability of the banks. SCP is criticized by Demsetz (1973) and Petzman (1977) and they presented efficient structure hypothesis (ESH). Banks with large market share are more efficient in making profit and profit is directly related to the efficiency whereas an inverse relation exists between bank concentration and prices. ESH suggests that performance of the big banks determine the structure of the banking industry and also emphasizes that higher efficiency leads to market concentration and profitability of the banks.

market would have perfect competition based on certain assumptions, such as there is large number of buyers and sellers, products are homogeneous, demand curve is horizontal, consumers have full information about market. However, Shaffer (1982) proposes that $H < 0$ for conjectural variation, oligopolistic market or for short run and $H = 1$ for natural monopoly; and $H = 0$ if firms maximize sales subject to breakeven investment. This methodology allows us to use bank level data and also consider the explicit productivity differences existing among banks. However it does not consider the explicit difference exist among banks such as large bank verses small banks; foreign bank verses domestic banks etc.

Bikker et al. (2006) criticize P-R revenue equation on the ground that it is misspecified because dependent variable in the form of ratio of total income to total assets along with natural logarithm of total assets as a scale covariate transforms the revenue equation into price equation. Most of the studies have been conducted to study the structure of the banking sector used misspecified revenue equation (Yildirim and Philippatos, 2003; Murjan and Rouza(2002), Buchs and Mathisen,2005; Matthews et al., 2007; Yildirim and Philippatos, 2007; Anzoategui et al., 2007; Majid et al.,2008; Rezitis, 2010). Some studies use total revenue as dependent variable and total assets as regressor to assess competition. Therefore there exists controversy between original Panzar and Rosse model and empirically estimated Panzar and Rosse equation. Many studies highlight that both price equation and revenue equation give different estimates of H-statistics (Goddard and Wilson, 2009). Therefore in this paper, we estimate scaled and unscaled revenue equations by controlling risk and size of the banks. In this respect this paper is different from the study of Khan (2009) on the measurement of competition in the banking sector of Pakistan.

This paper contributes in the literature by two ways using more reliable data set covering the period of deregulation; this paper also check the robustness of results of scaled and unscaled revenue equation controlling risk and size of banks using alternative econometric technique. We use the panel data of 22 commercial banks of Pakistan over the period 1995-2014. Static panel data techniques and system generalized method of Moment (SGMM) are used to estimate the revenue and profit functions.
The remainder of paper is organized as. Section two presents methodology and data for the estimation of revenue equation. Section

three discusses the empirical results of revenue and profit function using random effect model and SGMM. Section fourth concludes the finding of the paper and also provides the limitation of the study.

2. Methodology and Data

A number of studies are available on the estimation of competition in the banking sector (Bikker and Spierdijk, 2010; Andries and Capraru, 2016). Mostly three measures are used to measure competition; first Herfindahl Hirschman index; seconds, regularity indicator measure to test the degree of contestability; third, regression analysis is used to measure competition in the form of H-statistic. In this paper, to measure the competition in the banking sector over the period 1995-2014, we estimate H-statistics developed by Panzar and Rosse (1987). Following revenue equation is estimated by using bank level data to measure competition in the industry.

$$\ln R_{it} = \alpha_i + \sum_{j=1}^{n} \alpha_j \ln P_{j,i,t} + \gamma_i \ln Y_{it} + u_{it} \qquad (1)$$

Where R_{it} is the total income or total revenue of the bank; P_{it} is the vector of price of factor input j used to produce vector of quantity of output Y_{it}; and u_{it} is idiosyncratic term which is normally distributed i.e. $u_{it} \sim N(0, \delta^2)$. Panzar and Rosse 'H' statistic is calculated by summing up the coefficients of factor input prices as[6]

$$H = \sum_{j=1}^{n} \alpha_j \qquad (2)$$

In previous studies, interest income as a revenue is to capture the intermediation activities of banks. However, large firms earn more revenues in a way that input prices do not influence it. Some other studies use log of total assets and log of credit as control variable (Shaffar, 1982; Molyneux, Thornton and William, 1996; Coccorese, 2004; Staikouras et al. 2006; Barros and Mendes, 2016).

[6] Detailed derivation of Panzar and Rosse Revenue equation is given in Appendix. Also see Panzar and Rosse (1987) article for further informations

$$\ln R_{it} = \alpha_i + \sum_{j=1}^{n} \alpha_j \ln P_{j,i,t} + \beta_i \ln Assets_{it} + \gamma_i Credit_{it} + u_{it} \qquad (3)$$

Similarly in banking literature, many studies use log of ratio of total revenues and total assets as dependent variable. This ratio (TR/TA) constitutes the price of output. Therefore log-log price equation is estimated. Previous studies have investigated the relationship between price, input price and other control variables (De Bandt and Davis, 2000; Barros and Mendes, 2016).

$$ln\left(\frac{TR_{it}}{TA_{it}}\right) = \alpha_i + \sum_{j=1}^{n} \alpha_j \ln P_{j,i,t} + \gamma_i \ln Y_{it} + u_{it} \qquad (4)$$

Moreover to control firm size, log of total assets is used as controlled variable in equation (4)

$$ln\left(\frac{TR_{it}}{TA_{it}}\right) = \alpha_i + \sum_{j=1}^{n} \alpha_j \ln P_{j,i,t} + \beta_i \ln Y_{it} + \gamma \ln(TA_{it}) + u_{it} \qquad (5)$$

This type of equation has been used in previous studies (Molyneux, Lloyd-Williams, and Thornton, 1994; Bikker and Groeneveld, 2000; Bikker and Haaf, 2002; Claessens and Laeven, 2004; Yildirim and Philippatos, 2007; and Schaeck, Cihak, and Wolfe, 2009, Bikker, Shaffer and Spierdijk, 2012; Barros and Mendes, 2016).

2.1 Long run Equilibrium

For accurate estimation of H-statistics, it is necessary to assume that market should be in long run equilibrium. This implies that no relation exists between factor input prices and profit in the long run. In other words, banks should equalize the risk adjusted returns in long run. Following profit function equation is estimated by using standard panel data techniques.

$$\ln(1 + \pi_{it}) = \alpha_i + \sum_{j=1}^{n} \beta_j \ln P_{j,i,t} + \gamma_i \ln Y_{it} + \theta_i X_{it} + u_{it} \qquad (6)$$

Where π is the profit before tax of the commercial banks. Rest of the input and output variables are same as given in unscaled and scaled revenue equations. Shaffer's E-statistic for market equilibrium is calculated as

$$E = \sum_{j=1}^{n} \beta_j = 0 \qquad (7)$$

Dummy variable least square (DVLS) method is used to estimate panel fixed effect model and generalized least square method is used to estimate random effect model. Decision to choice between fixed effect and random effect model is made on the basis of Hausman test. Moreover for robustness of results, we use system Generalized Method of Moment (SGMM) of Arellano and Bover (1995) and Blundell and Bond (1998). Reason to use this technique is the presence of endogeneity problem in input and output variables appearing on the right hand side of above mentioned equations to be estimated. We use the lagged values of level variables as instruments for differenced equation and differenced variables as instruments for level equation.

We use Intermediation approach for the selection of input and output variables. Indeed, there is consensus in literature that banks use deposits as input variables to produce goods and services. Deposits incur the cost but do not generate revenues during production process until change into assets (Molyneux et al., 1996). Total banking assets are used to control size of banks (Molyneux, Thornton and William, 1996; Cocoorese, 1998; Bandt and Davis, 2000; Matthews et al., 2007; Yildirim and Philippatos, 2007; Rezitis, 2010). It is very important to consider total assets of banks, since large banks earn more revenues that are unrelated to variation in factor input prices compared to other banks. It is very unrealistic and hostile approach to measure total revenue equation without controlling size of the banks. Therefore we include total assets in the scaled and unscaled revenue equations to estimate the degree of competition.

Ratio of total loan and total assets represents credit risk and it is used as banking output variables because it generates interest income for banks (Molyneux, Thornton and William, 1996; Bandt and Davis, 2000; Yildirim and Phillipotas, 2002; Coccorese, 2004; Staikouras et al. 2006 etc). total revenue is the sum of interest income and non-interest income.

We use labor, physical capital and funds as a factor inputs and calculate its price (w) by taking the ratio of administrative expenditures which includes salaries and other employment benefit to the number of employees (Molyneux et al., 1996; Bandt and Davis, 2000; Shaffer, 1982; and Coccorese, 2004). We calculate price of funds by dividing interest expenses with total number of funds, and price of physical capital by taking ratio of depreciation of fixed assets to operating fixed assets (Molyneux et al., 1996: Bandt and Davis, 2005; Coccorese, 2004; and Buchs and Mathisen, 2005). Data on fund rates are not easily available; therefore we use interest expenses to total funds as a proxy for price of funds. We express input and output variables in natural logarithm. We collect balanced data of 22 commercial banks from banking statistics issued by SBP and annual reports of banks over the period 1995-2014. Descriptive statistic of the variables are given in table 1.

3. Results and Discussion

We estimate equation 1 using fixed effect and random effect model. Moreover Hausman test is used to test the null hypothesis that random effect model is consistent against alternative hypothesis that fixed effect model is consistent. We obtain the Hausman statistic with P-value greater the 0.05. Therefore we accept null hypothesis that random effect model is suitable for our analysis.

Table1: Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
lnRevenue	440	8.608	1.654	0.766	11.991
Lnprofit	440	6.692	1.930	0.9163	10.790
lnDeposits	440	10.423	1.870	4.913	14.237
lnassets	440	10.943	1.541	7.824	13.758
Ln(loan/assets)	440	-0.926	0.646	-5.927	6.621
Ln(wages)	440	6.338	1.885	1.845	16.093
Ln(Price of physical capital)	440	-2.591	1.437	-9.837	7.550
Ln(Price of financial capital)	440	-2.527	1.655	-6.834	6.972

Source: Author's own calculations

We also use Breusch Pagan Lagrange Multiplier (LM) test to choice between random effect model and panel least square regression. We obtain the LM statistic distributed as chi-square 140.50 (P-value 0.0000). We reject the null hypothesis that variance across commercial banks are zero. Hence we use random effect model for total revenue equation and we estimate it through Generalized Least Square Method (GLS). The results are presented in table 2.

3.1 Unscaled Revenue Equation Results

Column 2, 3 and 4 of table 2 indicates that coefficient of price of financial capital has positive and significant impact on total revenues of the commercial banks while coefficient of price of physical negatively and significantly impact total revenues.

Coefficient of wage is negative but insignificant. It is very interesting finding that the magnitude of coefficient of price of financial capital is higher than the coefficient of price of physical capital and wages for both equations (2) and (4). This does clearly indicates that excess physical capital has negative impact on revenues. These results are consistent with previous studies (Molyneux et al., 1996; Delis, 2010; Barros and Mendes, 2016). Coefficient of total assets (lnassets) has positive and significant effect on unscaled revenue in all three specifications. However the coefficient of total loans to total assets (ln(loans/assets)) has positive impact on revenues of banks but it turns significant in 1out of three models. The H-statistics is calculated and it is less than one in all specification. Therefore it reveals that monopolistic competition prevails in the banking sector of Pakistan. We observe that there is not existing variation in H-statistic reported in column 3. In column three, we use natural log of interest income in place of natural log of total revenues of the banks. Results reported in column 3 are not different from previous results. Column (5) of table 2 indicates the results of equation (5) using log of profit before tax as dependent variable. The results reveal that coefficients of factor input prices are insignificant and hence profit of the commercial banks is independent of factor input prices. Therefore this implies that in long run factor input prices are not correlated with the profit of the banks. These findings convince that the banking sector is in long run equilibrium in Pakistan.

Table 2: Results of Panzar and Rosse Unscaled Revenue Equation

	Unscaled Revenue			
Variables	**LnTR**	**LnTR**	**In(interest Income)**	**InProfit**
Trend	0.126*	0.015*	0.004	0.159**
	(0.000)	(0.000)	(0.415)	(0.029)
Ln(assets)		0.843*	0.822*	0.889*
		(0.000)	(0.000)	(0.000)
Ln(loan/assets)	0.010	0.041	0.048***	0.077
	(0.851)	(0.185)	(0.090)	(0.308)
Ln(wages)	-0.003	-0.032**	-0.050*	0.022
	(0.900)	(0.050)	(0.003)	(0.484)
Ln(Price of financial capital)	0.176*	0.244*	0.230*	0.027
	(0.000)	(0.000)	(0.000)	(0.536)
Ln(Price of physical capital)	-0.074*	-0.052*	-0.083**	-0.046**
	(0.002)	(0.001)	(0.000)	(0.018)
Constant	7.590*	-2.054*	-2.344*	-4.796*
	(0.000)	(0.000)	(0.000)	(0.000)
R-square	0.620	86.5	89.431	0.676
H-statistic	0.099	0.160	0.097	
H=0	11.62*	9.597*	26.374*	0.034
	(0.001)	(0.002)	(0.000)	(0.853)
H=1	950.53*	24.248*	21.778*	
	(0.000)	(0.000)	(0.000)	

P-values are given in parenthesis. InTR is the total revenues of the banks. *, ** and *** indicate the level of significance at 1%, 5% and 10% respectively. Source: Author's own calculations

Wald test is used to test the hypothesis that sum of elasticities ($H = \sum_{j=1}^{n} \alpha_j = 0$) are equal to zero against alternative not equal to zero. We accept the alternative hypothesis that sum of elasticities is not equal to zero. Similarly for long run equilibrium, we test the null hypothesis that sum of coefficient of factor inputs is equal to zero (E=0), against alternative not equal to zero. Chi-square statistic of Wald test is 0.034 with P-value 0.853. Therefore we accept null hypothesis that the banking sector is in long run equilibrium. Empirical results reveal that the banking sector of Pakistan is monopolistic competitive which is align with previous literature (Claessens and Laeven, 2004; Coccorese, 2004; Barros and Mendes, 2016 among many others).

3.2 Scaled Revenue Equation Results

We estimated equation (4) and (5) to check the robustness of results that have obtained in unscaled revenue equations and results are reported in columns 2 and 3 of table 3. The results are similar with scaled revenue equation. The coefficients of physical capital and financial capital have significant impact on ln(TR/TA). Again the magnitude of coefficient of price of financial capital is higher than the physical capital. Column 4 shows that the coefficient of ln(loan/assets), a measure of risk, has positive and significant effect on scaled revenues.

Table 3: Results of Panzar and Rosse scaled Revenue Equation

	Scaled Revenue	
Variables	**ln(TR/TA)**	**ln(TR/TA)**
Trend	0.006	-0.002
	(0.254)	(0.254)
Ln(assets)		0.127
		(0.000)
Ln(loan/assets)	0.052***	0.057
	(0.093)	(0.078)
Ln(wages)	-0.02	-0.013
	(0.326)	(0.326)
Ln(Price of financial capital)	0.127*	0.138*
	(0.000)	(0.000)
Ln(Price of physical capital)	-0.030**	-0.033**
	(0.050)	(0.029)
Constant	-2.385*	-1.864*
	(0.000)	(0.000)
R-square	0.870	0.870
H-statistic	0.077	0.092
H=0	19.270*	23.426*
	(0.000)	(0.000)
H=1	28.173*	28.173*
	(0.000)	(0.000)

P-values are given in parenthesis. *, ** and *** indicate the level of significance at 1%, 5% and 10% respectively. Source: Author's own calculations

Similarly column 5 indicates that the coefficient of lnassets and the ln(loans/assets), a measure of risk have positive and significant impact on scaled revenue. H-statistic is constructed and it is less than 1 which confirms the findings of previous results that the monopolistic

competition prevails in the banking sector of Pakistan. It is worth noting that the insignificant coefficient of lnwages does not affect the H-statistics in both scaled and unscaled revenue equations. Wald test results indicate that null hypothesis cannot be accepted which indicates that the banking sector in Pakistan is not characterized by oligopoly or any other non-competitive behavior.

Robustness techniques

To check the robustness of results, we also estimate the unscaled and scaled revenue equations by using SGMM due to endogeneity problem in financial variables and results are presented in table 4 and 5.

Table 4: SGMM Results of Panzar and Rosse Un-scaled Revenue Equation

	Un-scaled Revenue			
Variables	LnTR	LnTR	In(interest Income)	InProfit
Lagged Dependent Variable	0.739*	0.257*	0.328*	0.365*
	(0.000)	(0.000)	(0.000)	(0.000)
Trend	0.579*	0.005	0.008	0.132*
	(0.005)	(0.817)	(0.343)	(0.006)
Ln(assets)		0.804*	0.556*	0.605*
		(0.000)	(0.000)	(0.000)
Ln(loan/assets)	0.204**		0.039	0.251**
	(0.027)		(0.147)	(0.021)
Ln(wages)	-0.165***	0.016	-0.007	-0.248*
	(0.063)	(0.728)	(0.185)	(0.010)
Ln(Price of financial capital)	-0.071	0.111*	0.112*	-0.021
	(0.433)	(0.000)	(0.000)	(0.591)
Ln(Price of physical capital)	0.643*	-0.08**	-0.061***	0.277**
	(0.000)	(0.040)	(0.100)	(0.031)
Constant	10.748*	3.154*	1.898*	1.371
	(0.000)	(0.000)	(0.000)	(0.194)
R-square	0.620	0.915	0.912	0.770
H-statistic	0.407	0.047	0.044	
H=0	7.632*	3.980**	3.243***	3.981
	(0.006)	(0.047)	(0.072)	(0.046)
H=1	156.956*	160.91*	155.001*	
	(0.000)	(0.000)	(0.000)	

P-values are given in parenthesis. *, ** and *** indicate the level of significance at 1%, 5% and 10% respectively. Source: Author's own calculations

Perhaps, we have obtained the same results as by using static panel data technique. Most of the variables are significant with correct signs. Results from system GMM also ensure that the banking sector in Pakistan is monopolistically competitive. Table 4 and 5 show that values of H-statistic with alternative output variables are less than one but greater than zero. Magnitude of H-statistics from unscaled revenue equations estimated with SGMM is much closed to the random effect model result estimated with GLS. However magnitude of H-statistics from scaled revenue equation estimated with SGMM is greater than random effect model reported in table 3. Similarly, profit function estimation also reveals that the banking sector in Pakistan is in long run equilibrium.

Table 5: SGMM Results of Panzar and Rosse scaled Revenue Equation

	Scaled Revenue	
Variables	**ln(TR/TA)**	**ln(TR/TA)**
ln(TR/TA)t-1	0.182**	0.156***
	(0.049)	(0.107)
Trend	-0.099*	-0.155
	(0.000)	(0.122)
Ln(assets)		0.235*
		(0.000)
Ln(loan/assets)	-0.074*	-0.132
	(0.000)	(0.138)
Ln(wages)	0.234*	0.274*
	(0.000)	(0.000)
Ln(Price of financial capital)	0.106*	0.147*
	(0.000)	(0.000)
Ln(Price of physical capital)	-0.0213*	-0.265*
	(0.000)	(0.000)
Constant	2.935*	-5.456*
	(0.000)	(0.000)
R-square	0.700	0.538
H-statistic	0.3187	0.156
H=0	13.932*	15.104*
	(0.000)	(0.000)
H=1	65.189*	44.53*
	(0.000)	(0.000)

P-values are given in parenthesis. *, ** and *** indicate the level of significance at 1%, 5% and 10% respectively. Source: Author's own calculations

Estimation of scaled and unscaled revenue equations with SGMM also confirmed that the banking sector in Pakistan is monopolistically competitive which is aligned with findings in previous section with GLS technique.

4. Conclusion

In this paper, we investigated the competition in the banking sector of Pakistan using scaled and unscaled revenue equations based on size and risk of banks. We used balanced panel data of 22 commercial banks over the period 1995-2014 by employing fixed effect and random effect models. Random effect model is selected on the basis of Hausman statistics. Random effect model is estimated by using generalized least square (GLS) method. For robustness check, we also employed SGMM due to endogeneity problem in the revenue equations.
Our results from scaled and unscaled revenue equations reveal that monopolistic competition is prevailing in the banking sector of Pakistan. These results are robust and consistent with the findings of previous studies. Empirical results do not show any significant difference in the magnitude of coefficients of input and output variables between scaled and unscaled revenue equations.

Monopolistic competition in the banking sector of Pakistan demonstrates that privatization and restructuring of banks have fostered competition in the banking industry. We can say that if further private banks will enter in the banking industry, it will create competition among banks that result in optimal allocation of resources.

4.1 Limitation and Scope of the Study

The banking sector in Pakistan has introduced many innovative product and services such as auto loans, credit cards as well as Islamic product but we have considered only few output due to lack of data. However for future research, broad category of products can be included to study competition in the banking sector.

Future research could extend this paper by examining the competition in the banking sector by disaggregating banks into private, public and foreign banks to see whether the privatization and deregulation policy have provided level playing field to these banks. Secondly, this paper

can be extended by assessing the impact of competition on the supply and demand of banking products such as saving accounts, debit cards, mortgage etc.

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