Is Market Dominance still the Order of the Day? Traditional Approach Measuring Market Structure, Versus New

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Abstract

Earlier approaches which have tried to assess market structure in banking industry have relied upon using assets or deposits or even loans to calculate market shares, however using profit-after-tax as the relevant variable dramatically changes the results. This paper aims to use this approach and produce conclusive evidence about Pakistan's banking industries market structure, which so far has been classified as monopolistically competitive and is thought to be moving towards healthy levels of competition. Further analysis is built upon a simple model of market power in the market for loans.

Keywords: Market structure, Competition, Banking industry

Introduction

Pakistan's banking sector's market structure has been dominated by top five banks for a number of years. One of the motives of the regulatory strategy enacted by State Bank of Pakistan during the past two decades is to ensure healthy competition among all participants of the banking sector. Quite a number of steps have been taken to improve competition and market structure, such as privatization of government owned banks and promotion of mergers and acquisitions of financial institutions. This paper aims to analyze banking sectors market structure in the recent decade after the initiation of regulatory efforts enacted by SBP.

There has been growing evidence from developed countries of the world, confirming the fact that usually banking markets are characterized by dozens of firms, with many of them sharing very small portions of the market. This has industrial organization underpinnings to it and therefore banking industries can be identified on the basis of a few dominant firms and several fringe firms. Dominant firms in the industry are defined as those holding more than fifty percent of total assets or deposits or even loans. Dominant firms tend to exercise market power

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and get away with a major chunk of industries profits; this is obviously unhealthy for competition and hurtful to depositors and the economy as a whole. Therefore this dominance has to be checked.

1990 marks itself as the year in which broad based financial sector reforms were initiated in Pakistan's financial sector. Some analysts have termed 2005 as the year in which the transition was almost over. Twenty years later it seems as if policies must have had far reaching effects. Therefore the past decade from 2001-2010, is the setting for this research.

In Pakistan, the total number of banks by the end of FY 2010 was around forty. The average number of banks hovered around the same figure in the decade from 2000-2010. Although there were only 31 banks in 1990, the banking industry has come a long way, in the sense that there was a rapid transition of the sector in terms of new arrivals and mergers and acquisition taking place at the same time. High banking spreads are attributed as one reason; secondly, government policy has also been encouraging, as already mentioned. Unfortunately, top five banks have maintained a commanding position, even though some analysts claim that we are moving towards declining levels of market concentration. The claims of these analysts will be put to test in this paper, since their methodology seems to be faulty.

Table. 1

Table 1: Top five banks market shares								
	2001	2002	2003	2004	2005	2006	2007	2008	2009
Deposits	64.20%	67%	64%	59.85%	57%	55.39%	53.64%	54.83%	53%
PAT	54%	51.40%	52%	58.94	61.50%	67%	68.20%	93.88%	82%
Assets	61%	61%	59%	56%	54%	52.28%	51.90%	52.84%	50.40%

Most of the methodology for calculating market shares focuses upon using assets size or deposit size of respective banks, but the problem with these variables is that although market shares of top five Pakistani banks are on the decline in the past decade, both on the basis of assets and deposits, profit after tax shared by the top five is continuously on the rise, the past three years especially have seen a marked rise in the share of profits shared by the top five, with a peak in FY2008 at 93.88% and then again FY.2010. Therefore research focusing on market shares on the basis of assets or deposits or even loans should be handled with caution, since it could be quite misleading.

This paper, unlike its predecessors, focuses upon profit after tax as the relevant variable for measuring market concentration, and checking for dominance. Apart from analyzing market structure for signs of healthy competition, this paper also aims to test whether market

structure, because of presence of few dominant players, is influencing the market for loans or not. For this purpose a simple model of business loan market is developed and tested.

Several studies have been carried out to assess market structure of Pakistani Banking system. There are mixed results from these studies, however for the recent decade the results are in favor of monopolistic competition and reduced levels of market concentration. However, it would be worthwhile to mention the fact that top seven banks in Pakistan were fined in 2007 by the State Bank of Pakistan for behaving like a cartel. Pakistan does not have strict laws as far as monopoly control is concerned, and therefore this is quite a serious matter. The literature review section of this paper takes account of all such studies which have specifically been carried out in the timeframe of 2001-2009 and from before as well. The rest of the plan of the paper is as follows.

Section 3 focuses upon different methodologies to calculate market shares such as Herfindahl index, concentration ratios and Lorenz curves. This would be done on a comparative basis and profit after tax will also be used as the new variable. Section 4 focuses upon a model which has been used to check whether higher levels of market concentration in the latter part of the decade has caused loan rates to be higher and thereby a manifestation of market power by dominant players. Section 5 includes the results from the model. Section 6 is the concluding section.

Literature Review
Khan (2009), analyses market concentration levels in Pakistan's banking sector, using M-concentration ratio and PR H-statistic. His conclusion points to there being an existence of degree of competition in the banking industry. The time period for his paper is 1997-2007. And he calculates market share using asset size.

Bikker and Haaf (2000), give a review of ten different indices calculating market concentration. They also give a good explanation of structural approaches and non-structural ones. Structural approaches follow the Structure-Conduct- Performance paradigm (SCP) and the efficiency hypothesis. They follow the route of whether high concentration levels in a market cause collusive behavior among larger participants, which in turn results in good performance. Non-structural approaches such as Iwata model, Panzaar-Rosse model and Bresnahan model analyse competition in the absence of structural approaches, and they were developed to correct the deficiencies in structural approaches.

Claessens and Laeven (2003) use bank level data for 50 countries, and estimate degree of competition using Panzar and Rosse model. They find that countries with greater entry by foreign banks but

fewer entry and activity restrictions are more competitive in terms of their market structure.

Deltuvaite, Vaskelaitis and Pranckeviciute (2007), analyse Lithuania's banking sector using concentration indices, such as HHI and concentration ratios to find a decrease in the level of concentration. Monopolistically competitive structure is revealed through the Panzar and Rosse model. They further find out that there is a negative connection between competition and concentration, negative connection between concentration and efficiency ratios, and positive connection between competition and efficiency ratios.

Prasad and Ghosh (2005), have used the Panzar and Rosse model to assess competition in the Indian Banking system. Their approach is to break down the analysis into various sub-periods to see the effects of implementation of financial reforms in India. Their results point towards increasing progression of monopolistic competition in India.

Yildirim and Philippatos (2003), use the Panzar and Rosse model to determine changes in European banking markets over the years 1993-2000. They have found that these markets cannot be characterized by the bipolar cases of either perfect competition or monopoly, rather monopolistic competition prevails, and therefore there is a decreasing trend as far as market concentration is concerned.

Shaffer (1982),Molyneux et al (1994), Coccorese (1998), Rime (1999),Bikker and Groeneveld (2000), De Bandt and Davis(2000), all find evidence in favor of increasing levels of monopolistic competition in their respective countries which are either North American or European developed countries.

However Molyneux (1996) found evidence of a monopoly in the Japanese banking sector for the time periods of 1986-88.

Flechsig (1965), found no evidence of market concentration levels affecting the rates charged on short term business loans under $200,000. The differences exhibited in loan rates are mostly explainable on the basis of local or regional markets, as they are different in terms of supply and demand conditions.

Edwards (1964), on the other hand did find some evidence of high concentration being associated with less competitive price behavior. His approach focused upon first dividing U.S into Metropolitan Statistical areas(MSA's) and then testing for market concentration levels affecting business loan rates based upon different sizes of borrowers. He also observed the fact that quantitative effect on loan rates would be different under different methodologies used to calculate market concentration levels.

Dick (2006), analysed impact of increasing levels of nationwide branching on market structure, quality and bank performance, after the

relaxation of laws in the US which restricted banks to open up across states. He found no change in local concentration levels, increase in concentration in larger geographic areas and an increase in service quality. He also found an increase in bank profitability.

Methodology

Lorenz curve is a widely used methodology for calculating income inequality and distribution of various variables, ranging from income in Development Economics to nutrition levels in Health Sciences. The use of this approach is not novel to banking, but the writer couldn't find any research using this approach for Pakistani banking system.

Dick (2006), used this approach to outline differences based upon market structure changes in U.S Banking industry between the years 1993 and 1999. In his research Lorenz curves were used to find out any changes in concentration levels of dominant versus fringe firms, using deposits to calculate market shares. He found that the basic market structure did not change over the years, as the two Lorenz curves for 1993 and 1999 more or less superimposed each other.

Generally speaking, the lorenz curve plots the percentage of income being earned by various individuals, in a population, when the population is ranked in descending order of income. The further away a Lorenz curve is from the 45 degree line, the more unequal the distribution of the underlying variable.

In the context of this particular research however, it is the position of the two Lorenz curves of 2001 and 2009, relative to each other which is more relevant.
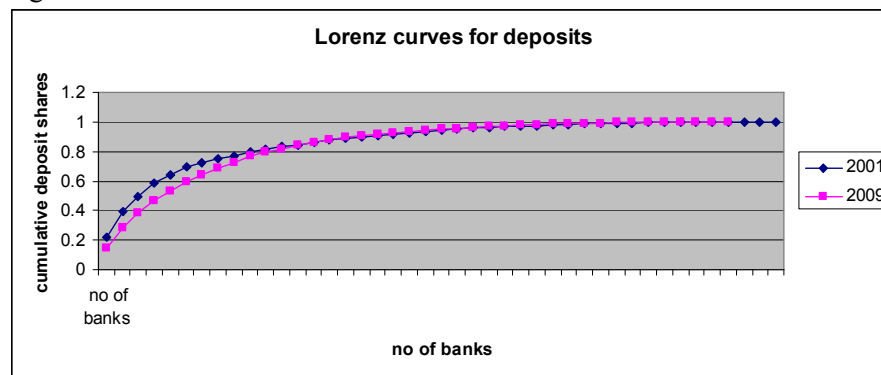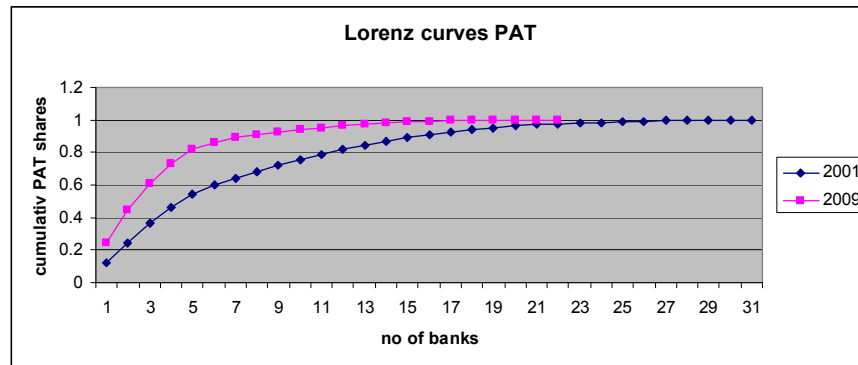
Figure. 1

Figure. 2

The analysis begins by using Lorenz curves on a comparative basis for 2001 and 2009. By comparison it means, first using deposit shares of Pakistani banks for both years and then using profit after tax for both years. What is strikingly evident from Figure 1 and Figure 2 is that although shares of deposits of top five banks are on the decline, the Lorenz curve for profit after tax for FY 2009 is considerably higher, for the top five banks, pointing towards an increase in market share of these banks in terms of profit after tax.

So therefore if we use profit after tax as the relevant variable for measuring market structure, the top five banks are definitely gaining more ground, since the Lorenz curve for 2009 is rising for the initial part of the distribution and the curve is much higher than the one for 2001, pointing towards an increase in market concentration levels when we use profit after tax, rather than a superimposition of the two which is the outcome(Fig 1), in case we use deposits as the variable for measuring market structure.

Table. 2

	Assets			Deposits			PAT		
	CR1	CR3	CR5	CR1	CR3	CR5	CR1	CR3	CR5
2001	20.98	47.3	61	21.9	49.4	64.2	12.4	36.66	53.9
2002	119.3	47.86	61	21.44	51.64	67.13	13.62	36.44	44.99
2003	18.32	45.96	59	19.99	48.92	64	14.35	37	52
2004	18.1	42.39	56	19.4	45.2	59.85	17.8	44.50	58.90
2005	15.7	39.1	54	16.35	41.26	57.2	19.2	46.35	61.5
2006	14.83	37.86	52.28	15.67	39.87	55.39	19.5	49.7	67.19
2007	14.73	37.65	51.9	15.35	38.97	53.64	23.52	52.7	68.2
2008	14.73	38.38	52.84	14.82	39.86	54.83	22.56	67.13	93.88
2009	14.24	36.58	50.4	14.5	38.22	53	24	60.6	82.1

Concentration ratios

The k-bank concentration ratio is another popular index for measuring market structure. Its popularity is attributable to its simplicity, since it measures the combined market share of the k largest banks in the industry.

$$CR_k = \sum_{i=1}^{k} si$$

Is the form that it takes, where k stands for the number of banks, usually the top three or even the top five are included. Summation is carried out for k-number of banks over their individual market shares, which could be based upon assets or deposits, or loans.

In order to further substantiate the Lorenz curve results, this time concentration ratios for all years have been used, for assets, deposits as well as profit after tax.

CR1 is the percentage market share for the top-most bank, which is steadily declining if we measure it for deposits and assets, which are traditional variables, used by earlier researches, whereas profit after tax market share of the top-most bank is steadily rising.   The same conclusions appear for CR3 and CR5. When profit after tax is used as the relevant variable results become contradictory to earlier evidence and concentration levels for top three and top five banks start rising instead of falling.

Table. 3

| | HHI | | |
	Deposits	Assets	PAT
2001	1082	987	746
2002	1142	983	727
2003	1044	922	758
2004	946	848	967
2005	832	762	1047
2006	809	744	1176
2007	785	739	1242
2008	794	748	1317
2009	761	706	1531

Herfindahl index

The HHI is by far the most acclaimed index for measurement of market structure. In the United States an application for merger between banks is

not accepted if the HHI increases beyond 1800 after the merger. It takes the following form:

$$HHI = \sum_{i=1}^{n} S_i^2$$

Where the squared values of market shares of all the banks in the industry are being summed up. The advantage of HHI over k-bank concentration index is the fact that all banks are included in the calculation of this index. Higher values of HHI over the years represent a higher concentration level among top banks.

Market structure is further explored by using the famous Herfindahl-Herschman Index this time. Earlier results are again reinforced. The HHI is falling on the basis of deposits and assets during the decade; however it continues to rise for profit after tax.

Data
Panel data for banks operating in Pakistan from 2001-2010 has been used in this research. For this purpose balance sheets and income statements available at State bank of Pakistan's website have been utilized. This results in 288 different panels of individual banks for ten years, each comprising of 5 variables which are used in the following model explained below.

Model
There is an exhaustive set of literature which relies upon using non-structural approaches such as the Panzar and Rosse model to measure what kind of competition prevails in banking industry. This model has been used in almost every country of the world and Khan (2009) uses the same approach in his paper on Pakistani banks. However, there are a number of assumptions which have to be satisfied in order to apply the PR-H model as it is called. Firstly, there has to prevail a long-term equilibrium in the banking industry, which means that there has to be a long time period free of entry and exits by banks. This is a very strong assumption to begin with and is incorrect as far as Pakistan's banking industry is concerned. Secondly, number of banks have to be endogenous to the model or in other words performance of banks needs to be influenced by the actions of other market participants. Lastly, price elasticity of demand has to be greater than unity.

Since all these assumptions are very hard to fulfill, rather than relying upon Panzar and Ross or even Breshnan models, which have been repeatedly used by many researchers, this paper uses a simple model of market power, to test if banks are exercising market power, in

the market for loans or not. The simplicity of this model lies in the fact that a prototype of it has been used to carry out some pioneering work in the field of concentration levels and their role in influencing banks to exercise market power by Edwards (1964) and then Flechsig (1965), and then by many other researchers, however none to my knowledge have used it in Pakistan's case. In this research a variation of the same model is used. Where the following equation represents a random effect version of the simple model since we are dealing with panel data.

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \dots + \beta_k X_{k,it} + u_{it} + \varepsilon_{it}$$

Uit represents between entity errors, and represents within entity error. Which translates into the following variables for this research

$$lrate_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 npl_{it} + \beta_3 igrate_{it} + \beta_4 lsize_{it} + u_{it} + \varepsilon_{it}$$

Dependent variable
Where lrate is the average loan rate charged by the ith bank in a specific year in the market for loans. This variable was calculated using balance sheets of banks.

Formula
Markup earned divided by total of advances (loans) plus total of investment securities.

Independent variables
CR_k is the market share of ith bank in a specific year, based upon several measures of market concentration calculated earlier, for instance, crprofit is profit of ith bank for jth year divided by total profit after tax of banking industry for that year. Crassets is assets for ith bank in jth year divided by total assets of industry for jth year, and this represents market concentration on the basis of assets. Crloans is similar ratio representing loans, crdeposits is the parallel variable for deposits.

　　　If banks are not exercising market power than the signs of coefficients crprofit, crassets, crloans, crdeposits should all turn out to be negative. Npl is another independent variable. Here it is calculated by taking provision of loan losses of ith bank for jth year. This is used to capture the effect of losses banks incur through non-performing loans, on the loan rates they charge. Expected sign of the coefficient is positive meaning that banks charge higher loan rates when they have larger loan losses.

　　　In order to capture the effect of growth in manufacturing sector on the loan rates that bank charge, growth in profits of banks is used as a

proxy variable, this has been named grate-loans. This variable is expected to have a positive sign, meaning that banks charge higher loan rates when there is growth in loan volume.

In order to capture the impact of size of business loans on loan rates charged by banks, the total volume of advances for ith bank in jth bank is a taken as a proxy variable. This variable has been named avglamount. This is also expected to have a positive sign

Results

The Breusch-Pagan Lagrange multiplier (LM) was used to decide whether a random effects regression should be used rather than a simple OLS regression. The results are in the following table:

Table. 4

```
Breusch and Pagan Lagrangian multiplier test for random effects

        lrate[years,t] = Xb + u[years] + e[years,t]

    Estimated results:
                        |      Var      sd = sqrt(Var)

                lrate   |   20.18494        4.492765
                    e   |    14.4033        3.795168
                    u   |   5.166592        2.273014

Test:   Var(u) = 0
                            chi2(1) =    183.80
                      Prob > chi2 =     0.0000
```

It turns out that a simple OLS regression is justified.
The following table summarizes the variables:

Table. 5

Variable	Obs	Mean	Std. Dev.	Min	Max
Names	0				
years	750	2005.5	2.874198	2001	2010
lrate	288	10.65973	4.633893	.0467946	43.79562
npl	288	1235079	2587863	-399436	1.92e+07
avglamount	287	5.43e+07	9.63e+07	0	4.78e+08
grateloans	269	-21.50691	401.7128	-3962.5	3269.231
crprofit	288	.0360768	.0975537	-.2079544	.7828209
crassets	288	.0347229	.0466089	.00078	.2497486
crloans	288	.0380512	.0734047	0	1
crdeposits	288	.0347222	.0498889	.0001074	.2683917

We start off by first regressing lrate on crprofit, npl, avglamount, grateloans. It turns out that the coefficient for crprofit has a positive sign,

meaning that banks are exercising market power, if profit after-tax is considered to be the variable measuring concentration. Npl and grateloans both have positive signs, however, avglamount turns out to be negative.

Table. 6

Source	SS	df	MS				
Model	197.525245	4	49.3813113		Number of obs =	268	
Residual	5191.85362	263	19.7408883		F(4, 263) =	2.50	
					Prob > F =	0.0429	
					R-squared =	0.0367	
					Adj R-squared =	0.0220	
Total	5389.37887	267	20.1849396		Root MSE =	4.4431	

lrate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
npl	4.61e-07	1.47e-07	3.13	0.002	1.71e-07	7.51e-07
avglamount	-9.50e-09	4.64e-09	-2.05	0.042	-1.86e-08	-3.61e-10
grateloans	.0004879	.0006898	0.71	0.480	-.0008704	.0018461
crprofit	.0469382	3.498677	0.01	0.989	-6.842044	6.93592
_cons	10.36847	.3160374	32.81	0.000	9.746187	10.99076

The regression results for lrate on crassets, npls, avglamount, grateloans are in the following table.

Table. 7

Source	SS	df	MS				
Model	197.677867	4	49.4194666		Number of obs =	268	
Residual	5191.701	263	19.740308		F(4, 263) =	2.50	
					Prob > F =	0.0428	
					R-squared =	0.0367	
					Adj R-squared =	0.0220	
Total	5389.37887	267	20.1849396		Root MSE =	4.443	

lrate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
npl	4.58e-07	1.50e-07	3.06	0.002	1.64e-07	7.52e-07
avglamount	-9.09e-09	5.81e-09	-1.56	0.119	-2.05e-08	2.35e-09
grateloans	.0004939	.0006855	0.72	0.472	-.0008557	.0018436
crassets	-.9105459	10.23702	-0.09	0.929	-21.0675	19.2464
_cons	10.38207	.3486993	29.77	0.000	9.695472	11.06867

Coefficient of crassets is negative, meaning that when market shares for banks are calculated using asset as the primary variable, rates charged by banks on loans fall. This means banks are not exercising market power, if market concentration is measured on the basis of assets. Similar results are achieved by regressing lrate on crloans, npl, avglamount and grateloans, and then also for lrate on crdeposits, npl, avglamount and grateloans.

Table. 8

Source	SS	df	MS			Number of obs =	268
						F(4, 263) =	3.29
Model	256.617109	4	64.1542772			Prob > F =	0.0119
Residual	5132.76176	263	19.5162044			R-squared =	0.0476
						Adj R-squared =	0.0331
Total	5389.37887	267	20.1849396			Root MSE =	4.4177

lrate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
npl	4.36e-07	1.46e-07	2.98	0.003	1.48e-07	7.24e-07
avglamount	-6.75e-09	4.23e-09	-1.59	0.112	-1.51e-08	1.59e-09
grateloans	.0004982	.0006795	0.73	0.464	-.0008396	.0018361
crloans	-7.041246	4.046414	-1.74	0.083	-15.00874	.9262439
_cons	10.51345	.3241781	32.43	0.000	9.875131	11.15176

Table. 9

Source	SS	df	MS			Number of obs =	268
						F(4, 263) =	2.52
Model	198.667709	4	49.6669272			Prob > F =	0.0419
Residual	5190.71116	263	19.7365443			R-squared =	0.0369
						Adj R-squared =	0.0222
Total	5389.37887	267	20.1849396			Root MSE =	4.4426

lrate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
npl	4.52e-07	1.51e-07	3.00	0.003	1.55e-07	7.49e-07
avglamount	-8.47e-09	5.71e-09	-1.48	0.139	-1.97e-08	2.78e-09
grateloans	.0004942	.0006836	0.72	0.470	-.0008518	.0018402
crdeposits	-2.222063	9.221392	-0.24	0.810	-20.37921	15.93509
_cons	10.3993	.3395921	30.62	0.000	9.730639	11.06797

Notice that the regression results for lrate on crprofit and other variables are not significant although the sign of the coefficient is positive showing that market power is being exercised by banks. So, to produce a more meaningful conclusion, next we focus on banks in the top ten in terms of share of profit. Since the midpoint of crprofit is around 0.0360768. Next we drop all banks having profit share less than this value, 213 observations are thus deleted. The results of the then run regression are in table 10.

Table 10

```
. summarize crprofit

    Variable |       Obs        Mean    Std. Dev.        Min         Max

     crprofit |       288    .0360768    .0975537   -.2079544    .7828209

. keep if crprofit>.0360768
(213 observations deleted)

. regress   lrate npl avglamount grateloans crprofit

      Source |       SS       df       MS                Number of obs =       73
                                                          F(  4,    68) =     1.72
       Model | 123.965191        4  30.9912977            Prob > F       =   0.1546
    Residual | 1221.74326       68  17.9668126            R-squared      =   0.0921
                                                          Adj R-squared =   0.0387
       Total | 1345.70845       72  18.6903951            Root MSE       =   4.2387


       lrate |      Coef.   Std. Err.        t    P>|t|     [95% Conf. Interval]

         npl |    5.65e-07    2.59e-07     2.18    0.033     4.78e-08    1.08e-06
  avglamount |   -8.53e-09    5.66e-09    -1.51    0.136    -1.98e-08    2.75e-09
  grateloans |    .0047663    .0053443     0.89    0.376    -.0058981    .0154306
    crprofit |    1.236174    4.455878     0.28    0.782    -7.655391    10.12774
       _cons |    9.138178     .965063     9.47    0.000     7.212425    11.06393
```

It turns out that the coefficient of crprofit is still positive and begins to gain weight as it jumps from a mere 0.0469 in earlier regression including all banks to 1.236. Also the level of significance tends to gain weight. All this goes to show that banks in the top ten are influencing the market for loans. A one percent increase in share of profit by top ten banks tends to increase loan rates at an average of 1.236%. This is quite substantial.

Conclusion

In this paper some of the most popular indices for measuring market concentration of banks have been used. The k-market concentration ratios as well as HHI all have been calculated by taking first assets, then deposits and then profit after tax as the underlying variables. The results for profit after tax are in contrast as they point towards market concentration levels rising rather than falling as in the case of assets and deposits. Hence the claim of falling concentration levels is refuted, if profit after tax is the relevant variable.

Secondly, rather than using the PR-H model, which is quite a popular route taken by most of earlier research's, owing to its criticisms and a stringent set of assumptions, a simple model of banking sector's loans, has been used to test if top banks are exercising market power . Again we get a re-enforcement of earlier results. When we measure market concentration calculated on the basis of profit-after tax, we get results in favor of banks exercising market power in the market of loans.

However, when deposits or assets are used as variables to calculate market concentration, results are contrary.

Developing countries like Pakistan and many others are heavily reliant on research produced from government dictated bodies, namely the State Bank of Pakistan. Such research over the past years has repeatedly produced evidence, pointing towards a decline in market concentration levels. But what they don't highlight is the fact that profit after tax has grown to extremely high levels for the top five banks, and therefore there is the need to re-address the situation and use newer approaches to analyze and gauge such high concentration levels on the basis of profit-after tax, rather than blindly going about using assets as the dominant variable for calculating market shares.

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