Assessment of Competition in Indian Banking

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Abstract

During the post 1991, financial system regulators have initiated many policy measures to enhance competition in the Indian Banking Sector. In the Indian context, competition has not been rigorously studied and hence, there is a need for more comprehensive analysis of competition in Indian banking sector. The article has applied PRH statistic for the panel data involving 36 banks for the period of 1994-2009 after the penetration of private banks. The article has found that there has been improvement in the degree of competition since 1994. Equity capital, as a control variable is influencing the level of competition. Analysis of competition allows the policy formulators to design proper liberalization measures, designing of financial products and business models to ensure greater competition in the banking sector.

Keywords: Competition, Market structure, Indian Banking, Panzar-Rosse H-statistic, Concentration.

1.   Introduction

Competition eliminates inefficiency that exists because of the underlying economic structure. Competition forces exit of inefficient firms and encourage the entry of low cost firms in the economic system. This process leads to gradual optimization of resources and building of efficient economic system where prices are not controlled by a single firm in the economy. The first most notable empirical model on competitive behavior was developed by Bain and is called the Structure-Conduct-Performance Paradigm. The S-C-P paradigm investigates whether a highly concentrated market causes a collusive behavior among large firms resulting in superior market performance. According to Baumol's theory, an efficient market can prevent entry of newer firms. New Empirical Industrial Organization (NEIO) was coined by Bresnahan (1989) and it focused on intra-industry comparisons. NEIO brought about empirical analysis by measuring degree of market power and introduced a proper measure of conduct by adding a variable called Conjectural Variations (Berry and Pakes, 2003). Theory suggests that banking competition can be inferred directly from the mark-up of prices over marginal cost (Lerner, 1934). In recent years, increasing number of articles has investigated competition in the banking industry. Banking sector liberalization, financial markets deregulation, financial innovations and merger and consolidation of financial services sector have called for assessing the level of competition in the banking sector.

Before the reforms in 1991, Indian Banks were working in a regulated system. Interest rates were controlled, credit was controlled, Statutory Liquidity Ratio (SLR) was high and Cash Reserves Ratio (CRR) requirements, were adversely affecting efficiency and financial stability. Even though there was rapid growth of deposits, profitability of banks was low. Committee on Financial System (CFS) was formed in 1991 as the survival of Indian Banking System was questioned due to wearing down of capital. The recommendations of the Committee focused on gradual reform measures to improve efficiency, productivity, competition and stability of the banking sector. Basel Committee recommendations on income recognition, asset classification, provisioning, capital adequacy and supervision were pursued at a steady pace. Significant changes in the competitive conditions in the Indian Banking System have been observed with the spreading of ownership of Public Sector Banks and flexible entry norms for private and foreign banks

The article seeks to estimate the degree of competition in the Indian Banking Industry using a panel data structure. The assessment of competition will help in designing further liberalization policies particularly in the areas of product development, customers' welfare, new entry norms, product pricing policy, capital planning, risk management and regional penetration of banking services.

2. Literature Review

SCP paradigm has been tested in the banking industry to look at market structure and competition in banking. Literature has shown the limitations of SCP paradigm and the strongest critic has been the contestability theory. The contestability theory suggests that a concentrated banking industry can behave competitively if the hurdles for entry and exit are low (Baumol et al., 1982). This theory states that the threat of potential entry forces banks with large market shares to price their products competitively under conditions like contestable markets. A contestable market has no entry barriers, either economic or legal. If the proponents of the contestability theory are correct, widely expressed concerns about the domination of a country's financial system by some type of financial intermediaries may be valid only to the extent that financial markets are not contestable (Nathan and Neave, 1989).

Bresnahan (1982, 1989) and Lau (1982) estimated the mark-up of price over marginal cost as a measure of market power. This model was based on two structural equations, an inverse demand equation and a supply equation derived from the first order condition of profit maximization. Shaffer (1989) rejected the collusive conduct hypothesis with a sample of US banks. Shaffer (1993) found that the Canadian banks were competitive for the period 1965–1989 even with a relatively concentrated market. Berg and Kim (1996) showed that Cournot behavior is rejected in the Norwegian banking system. Fuentes and Sastre (1998) found that banks consolidation in Spain did not weaken the competition. Gruben and McComb (2003) found that Mexican banks, before 1995, marginal prices were set below marginal costs and concluded that the Mexican market was super-competitive.

Panzar and Rosse (1987) explained that the sum of the elasticities of a firm's revenue with respect to the firm's input prices (PRH-statistic) can be used to identify the extent of competition in a market. Many studies have applied the PRH statistic approach to investigate competitive conditions and market structure in banking. Shaffer (1993) analyzed competitive structure in Canadian banking system for 25 years between 1965 and 1989. The findings were consistent with perfect competition and strongly rejected the hypothesis of joint monopoly. Thus, a highly concentrated market like Canada was found to be having very high competition, thus questioning the SCP model. Jeon *et al* (2010) articulated the effects of foreign bank entry in emerging countries and found that entry of foreign banks increased competition. If the entry were not through mergers or acquisitions, the competitive conditions were found to be better. Scott and Dunkelberg (2010) analyzed the impact of banks consolidation in US banking industry on small firm banking business. The article suggests that increased competition is negatively associated with both the change and level of deposit concentration.

Market structure and level of competition influence the monetary policy formulation and thus financial stability of an economy. Oliviera et al (2010) analyzed competition in banking with respect to banks lending channel and its effects on the monetary policy and economy of a country. A large bank would not be affected much by monetary tightening by the government and hence the monetary policy would not be very effective and it would impact the smaller banks more. Gunji et al (2009) analysed the effects of monetary policy shocks on economies with differently competitive banking sectors. Vives (2010) analysed the trade-off between competition and stability looking at the recent financial crises and the overall reaction of policy regulators to the financial crises. Author said that liberalization led to an overall increase in competition in financial intermediaries' along with the increase in incidences of financial crises.

Carletti and Hartmann (2002) examined the relationship between competition policies and policies to preserve stability in the banking sector. Bank mergers were either reviewed by supervising authorities whose aim was to look at stability or by competition authorities whose aim was to control market power. It was believed that high levels of competition may have lead to instability because of higher risk taking by banks. Keeley (1990) tried to see the relationship between competition and stability using two pooled estimations. Capital-to-asset ratios for 85 large US bank holding companies between 1971 and 1986 were regressed on their market-to-book asset ratio and a set of controls.

Assessment of competition in the financial sector of emerging market economies have been the focus area of research primarily due to the changes that have taken place in these economies during the last two decades. Anzoategui et al (2010) assessed competition in the Russian banking system and compared the level of competition with similar economies like India, Brazil and China. Authors expressed that bank concentration was in line with similar sized countries; however, the number of banks was significantly higher in Russia. Al-Jarrah and Gharaibeh

(2009) analyzed the relationship between concentration and efficiency in Jordanian banking system and found that reduction in concentration did not lead to increase in efficiency suggesting that higher concentration before liberalization was not leading to welfare losses in Jordan during the period 2000-2005.

Assessment of competition has been fairly well studied for the developed world. Competition studies for the developing nations have been of interest to researchers in the recent times due to economic reforms and financial sector liberalization initiated by these countries. The Indian banking sector has also gone through the process of deregulation and consolidation which is discussed in the section given below.

3.   Competition in Banking: The Indian Experience

Indian banking sector have been an area of research for researcher who have focused mainly on the post-liberalization era. Saha and Ravishankar (2000) measured the relative efficiency of public sector banks in India and found that, barring few exceptions, the public sector banks have in general improved their efficiency over the years 1992 to 1995. Sathye (2003) found that foreign banks entry did not have significant impact on concentration in the Indian banking system. Bhattacharya and Das (2003) found that there was a significant change in the levels of concentration in early 1990s and despite a spate of mergers in the late 1990s, the level of concentration did not change significantly. Varma and Saini (2011) analyzed the impact of bank size on the conduct of bank. Using conjectural variation model the study found that the biggest banks charge the lowest mark-up, indicating the increase in bank size through consolidation may not have negative implications in terms of abuse of market power by big banks. Prasad and Saibal (2005) analyzed competition in the Indian banking sector using PRH statistic for the period 1996-2004 and two sub periods 1996-1999 and 2000-2004. Findings suggest monopolistic competition for the overall period and the two sub-periods with higher levels of competition in the second sub-period. Zhao et, al (2010) studied the impact of deregulation on competition and performance of Indian Banks and argued that deregulation lead to efficiency and better performance in banking industry.

Looking at the literature review and above discussion, there is a requirement of formal approach to examine the level of competition in Indian Banking Sector after the liberalization taking into account deregulation, re-regulation and the post BASEL II period.

4.   Empirical Design

Empirical assessment of degree competition in market are developed by Bresnahan (1982, 1989) and Lau (1982) and Panzar and Rosse(1987). The Breshanan model explains the profit-maximizing firms would select their prices and quantities at that level where marginal costs equal to their perceived marginal revenue. It is a general equilibrium model. Panzar –Rosse H-Statistic (PRH) explains the relationship between change in factor input prices and revenue earned by specific bank. Panzar and Rosse model examines with the help of bank level data whether firm-level conduct is in accordance with the theoretical models of perfect competition, monopolistic competition, or monopoly.

Let y be a vector of decision variables that affect the bank's revenues. Let z be a vector of variables exogenous to the firm that shift the bank's revenue function so that R= R (y, z). The model assumes the bank's costs also depend on y, so that C = C (y, w, t), where w is a vector of factor prices exogenous to the bank, and t is a vector of exogenous variables that shift the bank's cost function. Thus the bank's profits can be written as π = R- C = π (y, z, w, t). Let Y_0 be the argument that maximizes the profit function and y1 be the output quantity that maximizes π (y, z, (1+h) w, t) where the scalar h is greater than or equal to zero. Let R_0 = R (Y_0, z) ≡ (be equivalent to) R* (z, w, t) and let R1 = R (Y_1, z) ≡ R*(z, (1+h) w, t), where R* is the bank's reduced-form revenue function. Then by definition,

$$R_1 - C(Y_1, (1 + h)w, t) \geq R_0 - C(Y_0, (1 + h)w, t) \qquad (1)$$

Since the cost function C is linearly homogenous in w, equation (1) can be written as

$$R_1 - (1 + h)C(Y_1, w, t) \geq R_0 - (1 + h)C(Y_0, w, t) \qquad (2)$$

Further,

$$R_0 - C(Y_0, w, t) \geq R1 - C(y1, w, t) \tag{3}$$

Multiplying both sides of equation (3) by (1+h) and adding the result to equation (2) yields the following:

$$-h(R_1 - R_0) \geq 0 \tag{4}$$

Dividing both sides of equation (4) by (-h2) yields

$$\frac{R_1 - R_0}{h} = \frac{[R^*(z, (1+h)w, t) - R^*(z, w, t)]}{h} \leq 0 \tag{5}$$

This non-parametric result indicates that a proportional cost increase results in decreased bank revenues. Assuming that the reduced-form revenue function is differentiable, taking the limit of equation (5) as h$\rightarrow$0 and dividing by R* yields

$$H \equiv \Sigma \frac{w_i(R^*w_i)}{R^*} \leq 0 \tag{6}$$

where the w_i are components of the vector w so that w_i denotes the price of the i-th input factor.

Equation (6) describes a restriction for a profit-maximizing monopoly where the sum of the factor price elasticities of the monopolist's reduced form revenue equation cannot be positive. Intuitively, the test statistic H indicates the percentage change in the bank's equilibrium revenue resulting from a one-percent increase in all factor prices. Increased factor prices shifts up all cost curves, including average costs, total costs and marginal costs. As a result, the monopolist charges higher prices and the quantity decreases. In addition, since the monopolist works on the elastic section of the demand curve, total revenue decreases and H is less than or equal to zero. According to the model, all firms that operate in isolation, where their structural revenue functions do not depend on any other agent's decision; will have an H that is non-positive.

Thus, the Panzar and Rosse (1987) model measures competition based on the relationship between the bank's factor prices and bank's total revenue. If the H value or H-statistic is less than zero, the financial system is a joint monopoly or collusive. If the H value or H-statistic is greater than zero but less than one, the financial system is a monopolistic competition. When the H value or H-statistic is equal to one, the financial system is perfectly competitive. If the H-statistic is greater than one, then the standard cost conditions would suggest that revenue increases by more than costs when factor prices rise. For example, if banks have monopsony power, then higher revenues may be associated with higher factor prices and, under certain combinations of elasticities of demand and factor supply, H may be > 1. There have been various modifications of the Panzar Rosse model. The basic model can be described as given below:

$$\ln(TR) = \alpha + \sum_i \beta \ \ln(W_i) + \sum \gamma_j \ln(CF_j) + e_{i,t} \tag{7}$$

where TR denotes total revenue, Wi the i-th input factor, and CF other firm specific control factors. PR H statistic shows the sum of input price elasticities.

$$H = \sum_i \beta \tag{8}$$

Equation (7) is the commonly used specification in the literature, though the choice of firm dependant and the firm-specific control variables varies. Some of the studies take interest income as revenues to capture only intermediation activities (Bikker and Haaf, 2002).Larger firm earn more revenues and is not related to input prices in anyways. Thus, some studies take Ln total assets as a firm specific control variable as shown in equation (7). Other studies take Ln TR/TA as the dependant variable in the PR model. This results in a Ln-Ln price equation instead of a Ln-Ln revenue equation.   The three versions of Panzar Rosse model are given below:

$$\ln(\text{TR}) = \alpha + \sum_j \beta \ \ln(W_i) + \sum \gamma_j \ln(CF_j) + \delta.\ln TA + e_{i,t} \qquad (9)$$

This form of Panzar Rosse H statistic has been used by Shaffer (2004) and other studies. The second form of Panzar Rosse model is:

$$\ln(\text{TR/TA}) = \alpha + \sum_i \beta \ \ln(W_i) + \sum_j \gamma_j \ln(CF_j) + e_{i,t} \qquad (10)$$

Another version of Panzar Rosse H statistic is:

$$\ln(\text{TR/TA}) = \alpha + \sum_i \beta \ \ln(W_i) + \sum_j \gamma_j \ln(CF_j) + \delta.\ln TA + e_{i,t} \qquad (11)$$

This form has been used by Bikker and Groenveld (2000), Bikker and Haaf (2002), Claessens and Laeven (2004) and others.

Accurate identification of the H-statistic is important. This is done using an estimated revenue equation which is based on a static equilibrium model. So, it is required to make an assumption that markets are in long-run equilibrium at any given point of time. Competitive capital markets should equalize risk-adjusted returns across banks in equilibrium and thus the equilibrium profit rate should not be correlated with the factor input prices. A test of the market equilibrium assumption which should be applied through fixed effect estimation of the following regression:

$$\ln(1 + \pi) = \alpha + \sum_i \varphi \ \ln(W_i) + \sum_j \gamma_j \ln(CF_j) + e_{i,t} \qquad (12)$$

where π = return on assets and the e statistic is $E = \sum \varphi_i$. The market equilibrium condition is E = 0.

The standard procedure for estimation of the H-statistic involves the application of fixed effects (FE) regression to panel data for individual firms. Under this procedure, the correct identification of the H-statistic relies upon an assumption that markets are in long-run equilibrium at each point in time when the data are observed. The panel data fixed effect revenue function can be written as follows:

$$\ln(R_{i,t}) = \alpha + \beta_1 \ln(W_{1,i\,t}) + \beta_2 \ln(W_{2i,t}) + \beta_3 \ln(W_{3,i,t}) + x_{i,t}Y + e_{i,t} \qquad (13)$$

where i indexes banks and t indexes time. Ri,t is financial income as a measure of the revenue for bank i in year t; Wj,i,t is the price of factor input j (j = 1 for financial expenses, j = 2 for administrative and operating expenses, and j = 3 for personnel expenses), all measured as the ratio of each type of expense to total assets. xi,t is a vector of exogenous control variables at the bank level, which includes the ratio of equity to total assets, the ratio of net loans to total assets, and the ratio of other income to total assets. αi is an individual bank effect, and ei,t is a random disturbance term. In the equation, the PRH statistic is given by the sum of the elasticities of revenue with respect to input prices, (β1+ β2+ β3). Under monopoly, PRH < 0; under perfect competition, PRH = 1; and under monopolistic competition, 0 < PRH < 1. As in Vesala (1995) and Bikker and Haaf (2002), it can be interpreted that the estimates of the PRH statistic as providing a continuous measure of the level of competition, with larger values indicating stronger competition.

Although the microeconomic theory underlying the Panzar- Rosse test is based on a static equilibrium framework, in practice adjustment towards equilibrium might be less than instantaneous, and markets might be out of equilibrium either occasionally, or frequently, or always. Goddard and Wilson (2009) suggest for a dynamic panel data structure to a dynamic model of the revenue function. They advocate for partial adjustment towards the long-run equilibrium

with a lagged dependent variable in the revenue equation and control variable for the revenue growth.

$$\ln(R_{i,t}) = \alpha_i + \beta_0 \ln(R_{i,t-1}) + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,i,t}) + \beta_3 \ln(W_{3,i,t}) + x_{i,t}Y + e_{i,t} \qquad (14)$$

Differentiating equation (2) w.r.t. $W_{1,it}$, we get,

$$\frac{1}{R_{i,t}}\left(\frac{\partial R_{i,t}}{\partial W_{1,i,t}}\right) = \left(\frac{\beta_0}{W_{1,i,t}}\right)\left(\frac{\partial R_{i,t}}{\partial W_{1,i,t}}\right) + \frac{\beta_1}{W_{1,i,t}} \qquad (15)$$

In equation (3), we assume that $R_{i,t} \approx R_{i,t-1}$. Re-arranging equation (15), we get,

$$\frac{\partial R_{i,t}}{\partial W_{1,i,t}} \cdot \frac{W_{1,i,t}}{R_{i,t}} = \frac{\beta_1}{1-\beta_0} \qquad (16)$$

Similarly,

$$\frac{\partial R_{i,t}}{\partial W_{2,i,t}} \cdot \frac{W_{2,i,t}}{R_{i,t}} = \frac{\beta_2}{1-\beta_0} \qquad (17)$$

$$\frac{\partial R_{i,t}}{\partial W_{3,i,t}} \cdot \frac{W_{3,i,t}}{R_{i,t}} = \frac{\beta_3}{1-\beta_0} \qquad (18)$$

Now,

$$H = \frac{\partial R_{i,t}}{\partial W_{1,i,t}} \cdot \frac{W_{1,i,t}}{R_{i,t}} + \frac{\partial R_{i,t}}{\partial W_{2,i,t}} \cdot \frac{W_{2,i,t}}{R_{i,t}} + \frac{\partial R_{i,t}}{\partial W_{3,i,t}} \cdot \frac{W_{3,i,t}}{R_{i,t}} \qquad (19)$$

Thus,

$$H = \frac{\beta_1 + \beta_2 + \beta_3}{1-\beta_0} \qquad (20)$$

Thus, we apply Goddard and Wilson (2009) approach for assessment of competition.

5.   Variable Description

Total Revenue to Total Assets is taken as the dependent variables. Independent Variables are Employee Expenses, Administrative Expenses and Funds Expenses. One period lagged dependent variable has been introduced in the equation so as to capture the market equilibrium. Revenue growth depends upon the growth in credit, investment and other income, which in turn depend upon the availability of Capital as per Basel-II norms. Hence, the ratio of equity capital to total assets is considered as the control variable in the revenue equation. The study has used unit cost prices for funds, labour, administrative expenses and capital.

Unit Cost Price for Funds : Ratio of Interest paid on funds to total funds
Unit Cost Price for Capital : Ratio of interest paid on Tier-II bonds to Total Tier-II Bonds
Unit Cost Price for Labour : Ratio of employee salaries and provisions to total number of employee.

6.   Sources of Data and Period of Study

Data on above mentioned variables are collected from the Reserve Bank of India publication on   "Data on Indian Banking". The period of study is spread over 1995 to 2009 and there are three panel data sets each 5 years. This would indicate the change in competition over time. 36 Commercial Banks, involving Public Sector, Domestic Private Sector and Foreign Banks have been considered in the analysis.

7.   Results and Discussion

Competition in Banking has led to progressive decline in the market share of public sector banks and subsequent enhancement of market shares of domestic private sector banks and foreign banks.   The market share in terms of deposits and advances of public sector banks has declined from 85% in 1995 to 73% in 2009.   During this period market share of domestic private sector banks increased from 7% to 21% and that of foreign banks declined from 8%

to 6%. This indirectly indicates the stiff competition in the Indian Banking Sector.

Competition has increased the employee cost significantly after the financial sector liberalization. Employee cost per unit (in Indian Rupee) increased from Rs.0.12 million per year in 1995 to Rs.0.57 million in 2009. On the other hand the cost of funds has declined from 6.50% in 1995 to 5.25% in 2009, primarily due to de-regulation of administered interest rate regime and significant reduction of pre-emption of credit. Over the years, profitability parameters have undergone drastic change because of enhanced competition. Net Interest Margin has reduced from around 3.5% in 1995 to 2.5% in 2009. Profit margin (Operating profit to Total Assets) remains within the range of 1.75%-2% during the last 15 years, despite significant growth in the total assets of the banking industry. However, there has been a significant decline in the Yield on Advances from 12% in 1995 to around 8% in 2009 indicating the impact of competition.

The econometric estimation of the Panzar–Rosse H-Statistic (PRH) is conducted for three different time periods spread over 1995-2009 to assess the level of competition. During the period 1995-2009 the PRH statistic was 0.725, indicating thereby existence of monopolistic free–entry market conditions. The results reject the prevalence of monopoly and perfect competition as PRH statistic is neither zero nor one. To understand the progressive nature of competition entire panel is divided into three parts with each panel having 174 observations. Hausman test suggest the use of fixed effect panel data estimation over random effect estimation.

Table -1 Panel Data Test Statistics

	1995-2009			1995-1999		
	Chi-Square	p-value	Result	Chi-Square	p-value	Result
Breusch-Pagan Test	176.105	0.0000	Random effect over OLS	56.8379	0.0000	Random effect over OLS
Hausman Test	48.9544	0.0000	Fixed effect over Random Effect	42.5102	0.0000	Fixed effect over Random Effect
	2000-2004			2005-2009		
	Chi-Square	p-value	Result	Chi-Square	p-value	Result
Breusch-Pagan Test	53.3722	0.0000	Random effect over OLS	25.2863	0.0000	Random effect over OLS
Hausman Test	22.471	0.0004	Fixed effect over Random Effect	32.894	0.0004	Fixed effect over Random Effect

Table -2: Panel Period: 1995 –2009, Fixed Effect with 535 Observations, Dependent Variable: Ln (Total Revenue)

	Coefficient	Std. Error	t-ratio	p-value
Const.	0.282	0.083	3.386	0.001
Ln_LC	0.061	0.009	7.197	<0.00001
Ln_FC	0.516	0.019	26.969	<0.00001
Ln_Size	1.018	0.011	91.815	<0.00001
Ln_OptC	0.148	0.012	12.363	<0.00001
Ln_Equity	-0.043	0.010	-4.256	0.000
Ln_TR_1	-0.013	0.004	-3.316	0.001
R-squared				0.994
Null Hypothesis for Common intercept			F(2,526)	10.368***

Linear restriction for PRH Statistic	F(1,526)	828.570***
PRH Statistic (Ln Lc+Ln Fc+ Ln OptC)		0.725

PRH Statistic increased from 0.61 in 1995-99 to 0.84 in 2000-2004 indicating there by enhancement of competition. However during the period 2005-2009 the PRH statistic declined to 0.34 primarily due to more government control on banking sector because of Global financial crisis.

Table -3 Panel Period: 1995 –1999
Fixed Effect with 174 Observations, Dependent Variable: Ln (Total Revenue)

	Coefficient	Std. Error	t-ratio	p-value
Const	-0.289	0.136	-2.127	0.035
Ln_LC	0.127	0.016	8.132	<0.00001
Ln_FC	0.350	0.045	7.851	<0.00001
Ln_Size	1.092	0.012	89.389	<0.00001
Ln_OptC	0.126	0.017	7.473	<0.00001
Ln_Equity	-0.101	0.010	-9.769	<0.00001
Ln_TR_1	-0.012	0.005	-2.236	0.027
R –squared				0.995
Null Hypothesis for Common intercept			F(4,163)	7.331***
Linear restriction for PRH Statistic			F(1,526)	157.6***
PRH Statistic (Ln Lc+Ln Fc+ Ln OptC)				0.610

Table -4 Panel Period: 2000 –2004
Fixed Effect with 174 Observations, Dependent Variable : Ln (Total Revenue)

	Coefficient	Std. Error	t-ratio	p-value
Const	0.427	0.146	2.917	0.004
Ln_LC	0.138	0.022	6.181	<0.00001
Ln_FC	0.627	0.039	15.959	<0.00001
Ln_Size	1.006	0.019	54.116	<0.00001
Ln_OptC	0.066	0.024	2.785	0.006
Ln_Equity	-0.041	0.017	-2.350	0.020
Ln_TR_1	0.009	0.007	1.258	0.210
R-squared				0.991
Null Hypothesis for Common intercept			F(4,164)	7.15***
Linear restriction for PRH Statistics			F(1,164)	313.1***
PRH Statistic (Ln Lc+Ln Fc+ Ln OptC)				0.840

The ratio of equity to assets, as the control variable, is significant in all panels. This result is as per the Basel-II guidelines whereby growth in assets (Loans and Investments) depends upon the availability of equity capital or the capital adequacy ratio. Size, as a scale variable, has significant impact on the total revenue. The scale variable differentiates banks on basis of balance sheet size and it is quite appropriate since size enable banks to command over market.

Table-6 Panel Period: 2005 –2009   Fixed Effect with 174 Observations, Dependent Variable: Ln (Total

Revenue)

	Coefficient	Std. Error	t-ratio	p-value
Const	-1.035	0.185	-5.589	<0.00001
Ln_LC	0.073	0.020	3.655	0.000
Ln_FC	0.198	0.044	4.531	0.000
Ln_Size	0.960	0.021	45.782	<0.00001
Ln_OptC	0.068	0.019	3.525	0.001
Ln_Equity	0.027	0.019	1.391	0.166
Ln_TR_1	-0.010	0.005	-1.886	0.061
R squared				0.995
Null Hypothesis for Common intercept			F(4,163)	8.05***
Linear restriction for PRH Statistics			F(1,163)	36.48***
PRH Statistic (Ln Lc+Ln Fc+ Ln OptC)				0.341

Contribution of Unit Price of Funds to PRH Statistic is significantly high in all periods. This also indicates the competition is quite significant in getting low cost funds and which primarily influence the revenue. The contribution of labor cost, though statistically significant in all panels, its contribution to competition or PRH statistic is low primarily due to availability of low cost trained manpower in India. The co-efficient of Operating cost in all the three panels is quite insignificant, indicating that the implementation of information technology over the years has reduced the operating cost   (other than wages and salaries) of Indian banks.

8.   Conclusion

The study examines the degree of competition in the Indian Banking Sector after the financial sector reforms. Financial sector liberalization has improved the efficiency, productivity and stability of the Indian Banking Sector. With three sub-period panel data analysis, the article finds that there has been improvement in the degree of competition since 1995. The PRH Statistic, which is positive and less than 1, indicates that the Indian Banking System is monopolistically competitive. It is true and validated fact that about 70% of the banking system assets in India are owned state-owned banks. It is also found that unit price of funds has significant contribution in the PRH statistic. It means that revenue growth is highly elastic to the funds cost.   Equity capital, as a control variable, is found to be statistically significant indicating thereby the revenue growth and competition would be more dependent upon the availability of capital in future.   As a policy implication it can be inferred that future growth of Banks in India depends upon the enhancement of regulatory capital base. Bank size is positively related to revenue indicating the beneficial effects of diversification of assets. Monopolistic market structure of banks in India indicates few big banks may be controlling the market. As a policy implication the competition commission should focus on any formation of cartel by big banks. As a part of enhancing market efficiency and competition the banking sector regulator should emphasize on further opening of the banking sector so as to reduce the market influencing power of big banks.

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