Does Competition Influence the Financial Soundness of Banks? Evidence from the Indian Banking Sector

** Santi G. Maji*
*** Preeti Hazarika*

Abstract

The impact of market competition on banks' financial soundness or stability is a current debatable issue in the banking literature. There are two contradictory theoretical views relating to this issue. While the competition fragility view states that competition and bank stability is negatively associated, the competition stability view describes this relationship to be positive. Empirically, researchers have also observed mixed results. This paper examined the influence of market competition on the financial soundness of Indian listed commercial banks. For this, 39 banks including both public and private sector banks were taken into consideration for a period from 1999-2013. In this study, we employed the PRH-statistics to measure the degree of competition. For measuring bank soundness, we used return on assets and market to book ratio. The present effort also examined the influence of customer capital on the financial soundness of Indian banks. The study found that Indian banks are working in a monopolistic free market structure and the degree of competition in public sectors banks is more than that of private sector banks. Employing fixed effect regression model and quantile regression model, the study found that the competition is inversely associated with the banks' financial soundness, which supports the traditional 'competition fragility' view. Furthermore, the positive impact of customer capital efficiency on bank soundness indicates the importance of maintaining good relations with the customers for enhancing bank performance in a competitive environment.

Keywords: **market competition, financial soundness, P R H-statistics, Indian banks**

JEL Classification : G21, G28, L11

Paper Submission Date: September 21, 2015 ; Paper sent back for Revision : May 13, 2016 ; Paper Acceptance Date : July 31, 2016

The impact of market competition on banks' financial soundness or stability is a current debatable issue in the banking literature that has attracted the attention of researchers worldwide. There are two contradictory theoretical views in this respect. Under the traditional "competition fragility" view, in a competitive market, banks are forced to take more risks on behalf of the stakeholders to increase returns because competition reduces the profits of the banks as well as the customer base (Carletti & Hartmann 2002 ; Demetz, Saidenberg, & Strahan,1996 ; Keeley, 1990 ; Marcus, 1984). There is, thus, an inverse relationship between competition and financial soundness (Keeley, 1990) or in other words, the association between competition and bank risk is positive. The findings of Berger, Klapper, and Turk-Ariss (2009) empirically supported the traditional competition fragility view in case of 23 developed nations.

As an alternative to this view, in recent times, Boyd and Nicolo (2005) proposed a very interesting and challenging view known as "competition stability" view. According to this view, less competition leads to more market power, which encourages banks to increase interest rate on bank loans. This may increase the credit risk of

**Assistant Professor,* Department of Commerce, North-Eastern Hill University, Shillong-793 022.
E-mail: sgmaji2010@gmail.com
***Research Scholar,* Department of Commerce, North-Eastern Hill University, Shillong-793 022.
E-mail : Preetihazarika1987@gmail.com

borrowers as a result of moral hazards and adverse selection problem. This increase in firms' default risk results in increased bank problem loans and ultimately reduces the financial stability of banks. In contrast, greater competition in the banking industry reduces the rate of interest that attracts borrowers with more safety projects and the risk of loan default decreases. This view, thus, states that competition and bank stability or soundness is positively associated. Boyd, De Nicolo, and Jalal (2007), De Nicolo and Loukoianova (2007), and Schaeck, Cihak, and Wolfe (2009) empirically supported the "competition stability" view.

The dynamic competitive financial environment of today's world has a direct impact on banks' soundness and stability because of the existence of various types of risks. Competition has both positive as well as negative effects on the banking system. Higher competition may leads to innovation, better quality financial products, and better prices for the individual customer and the society as a whole. The competition, thus, improves the financial soundness of banks, which is consistent with the 'competition stability' view. On the other hand, 'competition fragility' view states that higher competition affects the solvency of banks, which may ultimately lead to financial instability. Thus, assessment of competition and its influence on financial soundness of banks is of crucial importance. The extant literature, however, indicates that many researchers have tried to address the issue empirically in the recent past, but most of the studies are concentrated in the developed countries (Allen & Gale, 2004 ; Beck, De Jonghe, & Schepens, 2013 ; Berger et al., 2009 ; Carletti & Hartmann, 2002 ; Maudos, 2012 ; Molyneux, Lloyd-Williams, & Thornton, 1994 ; Schaeck et al., 2009).

In the context of the Indian banking sector, some researchers have investigated the importance of capital adequacy ratio to improve the financial soundness of the banking sector (Ghosh, Nachane, Narain, & Sahoo, 2003 ; Gupta & Mehta, 2011 ; Maji & De, 2015 ; Maji & Dey, 2012 ; Murali & Subbakrishna, 2008 ; Pascha, Srivenkataramana, & Swami, 2012 ; Rao, 2005). A few empirical studies have also examined the degree of competition in the Indian banking system (Arrawatis & Misra, 2012 ; Maji & Hazarika, 2014 ; Prasad & Ghosh, 2005). But the empirical studies relating to the impact of competition on the stability and financial soundness of Indian banks in scanty in the existing literature, although the prior studies have indicated that the degree of competition has increased during the past decade (Arrawatis & Misra, 2012 ; Maji & Hazarika, 2014).

The findings of the earlier researchers relating to the increase in competition motivated us to undertake a comprehensive study in the Indian context covering both public sector and private sector banks to find out the answer of two basic research questions. Is there any association between competition and bank soundness? If yes, which of the two contradictory theoretical views relating to competition and bank stability is tenable empirically in the Indian context? This paper is a modest attempt to address the above research questions in the context of listed Indian commercial banks. Therefore, an important contribution of this paper is to provide empirical evidence on the impact of competition on financial soundness of Indian banks during Basel I and Basel II periods.

For measuring the degree of competition, we have used the H-Statistic (Panzar & Rosse, 1987). H-statistic considers three important factors (deposit, human resource and technology, and fixed assets) for measuring the degree of competition. Plethora of empirical studies have indicated that human capital, structural capital (technology, innovation, new processes, etc.), and relational capital play a vital role for enhancing the financial soundness of banks in the new economy dominated by knowledge-based resources (Maji & Goswami, 2014). Since H–statistic considers the contribution of human capital and partly structural capital; we have included the relational capital or customer capital as another explanatory variable along with degree of competition. Therefore, an additional contribution of this paper is to provide empirical evidence relating to the influence of relational capital on the financial soundness of Indian banks.

Literature Review

Plethora of empirical studies have recently used the Panzar and Rosse (1987) H-statistic to measure the degree of competition in developed and developing economies. Claessens and Laeven (2004) employed H-statistic for 40

banks in Poland during 1994-2001 and observed monopolistic competition in the market. Likewise, in the context of the Hungarian banking sector, Varhegyi (2004) found medium to strong monopolistic competition. Schaeck and Cihak (2007) also observed a high degree of competition for the banks from 10 European countries during 1999-2004. However, Levy-Yeyati and Micco (2007), using H-statistic for measuring the degree of competition in the context of eight Latin American countries, concluded that due to foreign penetration, the degree of competition was less. Recently, Simpasa (2013) also observed the elements of monopolistic competition in case of 18 chartered commercial banks of Zambia. Employing H-statistic in the context of the Indian banking sector, Prasad and Ghosh (2005) during 1996-2004 and Maji and Hazarika (2014) also found monopolistic competition. Likewise, the findings of Arrawatia and Misra (2012) indicated the existence of monopolistic free-entry market condition in India, which is a feature of banking structure in developed countries and other emerging markets.

Although most of the researchers have observed the monopolistic competitive environment in the banking sector of developed and developing nations, the empirical results relating to the impact of competition on bank stability and soundness are inconsistent like the theoretical contradictory views. Many researchers have investigated empirically the validity of 'competition-stability' and 'competition-fragility' views in different countries, but the results are contradictory. Boyd et al. (2007) provided empirical evidence which supports the "competition stability" view of positive association between competition and stability. In contrast, the findings of Lopez-Espinosa, Rubia, Valderrama, and Anton (2010) indicated a negative relationship between market power and risk-taking in the Spanish banking sector. The study concluded that an increase in firm default risk leads to higher non-performing loan ratios and greater bank instability. On the other hand, Kick and Prieto (2015) in case of German banking system during 1994-2010 observed that a more competitive market environment goes hand in hand with a lower level of bank risk, that is, higher bank competition has higher risk-reducing effect. However, a study conducted by Tabak, Laiz, and Cajueiro (2013) found that in the Brazilian banking industry, a bank with higher market power takes more risk than a bank with less market power.

Contradictory results are also evident from cross-country data. For instance, empirically, Boyd et al. (2007) on a large U.S. and international sample indicated that increased competition did not lead to unstable banking environments. A cross-country study on 38 countries for the period from 1980 - 2003 conducted by Schaeck et al. (2009) offered empirical support for the 'competition stability' theory rather than the 'competition fragility' view. The results strongly supported that competition and soundness are positively associated but the same might not always be true in a perfectly competitive system. Beck et al. (2013) conducted a study on 62 countries including both developed and developing countries for a period from 1994-2006 to find evidence on the association between bank competition and soundness. By using a large sample of banks all over the world, the study indicated that the relationship between market power and bank soundness was positive, but competition and stability had insignificant relationships in many countries.

Anginer, Demirguc-Kunt, and Zhu (2012) assessed the relationship between bank competition and systemic stability of 1,872 unique publicly traded banks in 63 countries from 1997 to 2009. Their results concluded that greater competition encourages banks to take on more diversified risks, making the banking system less fragile to shocks. In contrary, using a large data set from 23 developed nations, Berger et al. (2009) examined the two theories relating to the association between bank competition and risk. The findings of the study, to a large extent, supported the traditional "competition-fragility" view, that is, banks with a higher degree of market power (or less competition) have less overall risk exposure and better stability.

Apart from the positive and negative association between competition and stability or soundness of banks, empirically, the researchers also observed a non-linear relationship. For instance, a study conducted by Stanek (2012) to investigate the relationship between competition and risk-taking in case of Czech banking industry for the period from 2002 to 2010 indicated that there existed a non-linear relationship between competition and risk taking. Similar results were observed by Tabak et al. (2013) in the context of banks from Latin American countries and the study concluded that results supported both theories of concentration-stability and concentration- fragility

due to a nonlinearity of the effect of competition on risk-taking. The results indicated that banks under high and low competition are, on an average, more stable than banks under average competition. In other words, banks in competitive markets are more stable, especially if they are larger in size. It is also evident from the study that in a competitive environment, banks with a larger capital ratio are more financially stable.

The empirical evidence relating to the association between competition and stability or financial soundness, thus, provides contradictory findings in both developed and developing countries. In this backdrop, the present effort is intended to examine which of the two contradictory views is empirically tenable in the Indian context. Furthermore, in an economy dominated by creation and diffusion of knowledge, intellectual or intangible resources have emerged as the core contributor of value creation and the crux of achieving entrepreneurial success (Chen, Cheng, & Hawang, 2005 ; Dalkir, 2005). A plethora of articles and books have shed light on the increasingly dominant role of intellectual resources comprising of human resources, organizational structure, technology, innovation, and relation with others in corporate value creation (Chen et al., 2005 ; Edvinsson & Malone, 1997; Stewart, 1997). In case of banks, like any service sector, relationship with customers plays a crucial role for stability and soundness of a bank. But only a few studies have examined the role of relational or customer capital in enhancing banks' soundness. Nazari and Herremans (2007) and Ghosh and Maji (2015) used advertisement, publicity, and marketing expenses as a proxy to measure the relation with customers and observed a positive impact of customer capital efficiency on firm performance.

Data and Methodology

(1) Data and Study Period : The present study is based on secondary data collected from 'Capitaline Plus' corporate data database and annual reports of the respective Indian commercial banks. The relevant secondary data were collected for a period of 15 years from 1999-2013. The selection of the study period is important for several reasons. First, the initial year of 1989-99 is taken into consideration because the RBI took a decision to revise the Basel I norms based on the mid-term review of monetary and credit policy. Second, the study period covers both Basel I (revised) period and Basel II period, where the extant literature indicates a significant increase in the degree of competition in the Indian banking sector. Third, it is possible to include almost all the new generation private sector banks in the sample of the study. At the end of March 2014, there were 41 Indian commercial banks which were listed on the BSE (of them 12 were listed on the NSE). Out of the 41 listed banks, Standard Chartered Bank and Yes Bank are excluded because Standard Chartered Bank is the only foreign bank listed in India and for Yes Bank, the required data were not available for the entire study period. Thus, the final sample consists of 39 banks out of which 24 are public sector banks and 15 are Indian private sector banks.

(2) Measurement of Variables

(i) Degree of Competition : To measure the degree of competition, we have employed H-Statistics (Panzar & Rosse, 1987), known as PRH model, on a panel data set for a period of 15 years (1999-2013). It is a non-structural approach, which is designed to test the nature of market structure, whether it is a perfect competitive market, monopolistic, or a monopoly market. H-Statistics is considered to be most appropriate measure of competition as compared to other measures of competition (Claessens & Laeven, 2004).

The degree of competition measured by H statistics is based on the general banking market model. This model determines the equilibrium output and the equilibrium number of banks by maximizing profits both at the bank level and the industry level. The bank maximizes profit when the marginal revenue equals marginal cost. Mathematically, this can be expressed as:

$$R'_i(x_i, n, z_i) - C'_i(x_i, w_i, t_i) = 0 \qquad \text{....(i)}$$

where, R'_i represents revenue and C'_i denotes the cost of bank i, x is the output of the bank, and n indicates the number of institutions. The term w_i is the vector of m input price of the bank i, while z and t represent vectors of exogenous variables that shift the bank revenue and cost functions, respectively (Panzar & Rosse, 1987; Schaeck & Cihak, 2007; Trembovetskyi, 2010).

Employing the same logic for the market level yields the following equation:

$$R^*_I(x^*, n, z_i) - C^*_i(x^*, w, t) = 0 \qquad .....(ii)$$

where the asterisks denote equilibrium value.

H-Statistics is derived from a reduced form of revenue equation of the firm, where revenue is equal to factor prices and some bank specific variables that affect long run bank revenue. It examines the impact of changes in factor input prices on the revenue earned by a particular bank by applying bank level data (Arrawatia & Misra, 2012 ; Prasad & Ghosh, 2005; Powlowska, 2012 ; Schaech & Cihak, 2007; Simpasa, 2013). The basic form of the PR model is:

$$ln\,(TR) = \alpha + \sum_{i=1}^{n} \beta_i \ln(W_i) + \sum_{j=1}^{k} \gamma_j \ln(CF_j) + \varepsilon \qquad .....(iii)$$

In this model, *TR* is the total revenue, W_i is the *i*th input factor, and *CF* denotes other firm specific control factors. Many researchers have used *TR/TA* as the measure of dependent variable instead of *TR* only (Bikker & Groeneveld, 1998 ; Bikker & Haaf, 2002 ; Claessens & Leaeven, 2004). Following the earlier researchers (Bikker & Groenveld, 1998 ; Bikker & Haaf, 2002 ; Claessens & Leaeven, 2004), we have also used total revenue as a share of total assets as a proxy for output price of loans and other services. Researchers have used a common elaborated revenue equation where they assumed a linear form of relationship between dependent and independent variables (Claessens & Laeven, 2004; Prasad & Ghosh, 2005; Schaeck & Cihak, 2010 ; Simpasa, 2013 ; Turk-Ariss, 2010).

Following the standard procedure of estimating degree of competition in the banking sector based on PRH model in the extant literature, we have employed the following regression model:

$$ln\,(R_i) = \alpha_i + \beta_1\, ln(W_{1i}) + \beta_2\, ln\,(W_{2i}) + \beta_3\, ln\,(W_{3i}) + \gamma_1\, ln\,(CF_{1i}) + \gamma_2\, ln\,(CF_{2i}) + \gamma_3\, ln\,(CF_{3i}) + \gamma_4\, ln\,(CF_{4i}) + \varepsilon_i$$

..... (*Model* 1)

where,

R= Total revenue/ total assets (proxy for output price of loans and other services and includes total interest revenue, fee income, commission income, and other operating income),

W_1 = Interest expenses/total deposits and money market funding (proxy for input price of deposits) ,

W_2= Personnel expenses to total assets (proxy for input price of labor or human resource),

W_3 = Other operating and administrative expense to total assets (proxy for input price of equipment and fixed assets),

CF_1= Ratio of deposits to deposits and money market funding,

CF_2 =Net loans to total assets,

CF_3 = Equity to total assets, and

CF_4 = Bank size, measured as total balance sheet assets.

The PR H-Statistic is the sum of input elasticities, that is, $H = \sum_{i=1}^{3} \beta_i$ ..... (iv)

The interpretation of H-statistic is:

$H \leq 0$ indicates monopoly equilibrium,
$0 < H < 1$ indicates monopolistic competition,
$H = 1$ indicates perfect competition.

(ii) Measure of Financial Soundness : Financial soundness of a banking system indicates its good financial health. It is reflected from the bank's efficiency and good financial performance and is greatly influenced by tough competitive market conditions. Theory says that high competition can affect the financial soundness of banks in both positive or in negative ways. In a deregulated market, when the competition is very high, some banks increase their interest rate to some extent and grant risky loans, attract more deposits, while other banks try to play safe. Higher risk rewards higher profits and vice-versa. Thus, in a highly competitive market, banks' profitability can be increased when they take more risks, which will ultimately enhance their financial soundness.

Many researchers have used financial soundness indicators like capital adequacy, profitability ratios, solvency ratios, asset quality, efficiency ranking, liquidity position, and so forth to capture the damage caused by Asian crisis of 1997 and financial crisis of 2007 (Moorhouse, 2004; Maudos, 2012; Navajas & Thegeya, 2013). Profitability is considered to be the primary measure of the overall success of any business (Bharathi, 2010). The ability to earn profit acts a motivational tool that gives stability to a business concern. In this study, we have used two widely used ratios – return on assets (ROA) and market to book ratio (MB ratio) to measure the financial soundness of Indian commercial banks. ROA is defined as the ratio of operating profit to total assets. On the other hand, market to book ratio (M/B) is calculated by dividing the market value *(MV)* by book value *(BV)* of common stock.

To examine the influence of competition on financial soundness of select Indian commercial banks, the following fixed effects [1] panel data regression models are employed here:

$$ROA_{it} = \alpha_i + \beta_1 COMPT_{it} + \beta_2 CCE_{it} + \beta_3 SPREAD_{it} + \beta_4 SIZE_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots (Model\ 2)$$

$$MBR_{it} = \alpha_i + \beta_1 COMPT_{it} + \beta_2 CCE_{it} + \beta_3 SPREAD_{it} + \beta_4 SIZE_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots (Model\ 3)$$

where, *ROA* is the return on assets; *MBR* is market to book value ratio; *COMPT* is the degree of competition for each year computed with the help of Model 1 using cross section data; *CCE* is customer capital efficiency measured by the ratio of advertising and publicity expenses/ net income. The advertising and publicity cost is used as a proxy for customer or relational capital (Nazari & Herremans, 2007); *SPREAD* is the ratio of net interest margin (difference between interest earned and interest expenses) to total assets and *SIZE* indicates the size of bank, which is measured by natural log of total assets. In this model, we have used *SPREAD* and *SIZE* as control variables.

Results and Discussion

(1) Descriptive Statistics : Descriptive statistics of the variables containing mean, median, 5% trimmed mean, and skewness are shown in the Table 1 for all banks as well as for public sector banks and private sector banks. The basic purpose of the descriptive and robust statistics is to explore the empirical distribution of the variables used in this study. Near equality of the values of mean, median, and 5% trimmed mean indicates a symmetric distribution of the variable and otherwise with skewness. The values of mean and 5% trimmed mean for all the variables are

[1] The Fixed effects model is found to be appropriate for the present data set based on Breusch- Pagan test and Hausman test.

almost equal for the combined data set including all select banks except *MBR* and *CCE*. Both *MBR* and *CCE* are highly skewed (positively). This implies the existence of some out-performing banks in the data set. However, from the results of public sector and private sector banks, it is evident that *MBR* is less skewed for public sector banks as compared to private sector banks. This indicates that some private sector banks have improved the *MBR* considerably higher than other private sector banks. On the other hand, the distribution of *CCE* is far away from symmetry for both the bank groups. The skewed distribution is the indication of the existence of outliers in the data set and the use of the classical linear model may provide biased view of the relationship when the dependent variable is not symmetrically distributed.

Table 1. Descriptive Statistics

Banks	Variables	Mean	Median	5% Trimmed Mean	Skewness
All banks	COMPT	0.487	0.420	0.493	0.007
	ROA	1.187	1.179	1.184	0.530
	MBR	1.104	0.897	0.957	3.217
	SIZE	10.806	10.854	10.821	-0.114
	CCE	0.324	0.203	0.267	4.844
	SPREAD	0.026	0.026	0.026	-5.713
Public Sector Banks	COMPT	0.482	0.420	0.488	-0.011
	ROA	1.045	1.059	1.050	-0.571
	MBR	0.806	0.790	0.774	0.569
	SIZE	11.394	11.308	11.328	0.264
	CCE	0.183	0.151	0.170	2.063
	SPREAD	0.028	0.026	0.026	9.121
Private Sector Banks	COMPT	0.488	0.420	0.494	-0.002
	ROA	1.397	1.386	1.393	0.697
	MBR	1.765	1.101	1.280	3.393
	SIZE	9.944	9.851	9.913	0.366
	CCE	0.548	0.370	0.471	3.515
	SPREAD	0.023	0.025	0.025	-9.210
H-Statistic for all the banks (1999-2013)					**0.782**
Adjusted *R*-square					0.516
F-Statistic					14.836***
H-Statistic for Public Sector Banks (1999-2013)					**0.855**
Adjusted *R*-square					0.702
F-Statistic					29.25***
H-Statistic for Private Sector Banks (1999-2013)					**0.481**
Adjusted *R*-square					0.468
F-Statistic					10.417***

Notes: *** indicates significant at 1% level.

ROA- Return on Assets (profitability), MBR- Market to book value ratio, COMPT- Degree of Competition, CCE- Customer Capital Efficiency, SPREAD- Interest Spread, SIZE- Size of the bank.

H-Statistic is the measure of the degree of competition.

For assessing the degree of competition in the Indian banking sector, H-statistic is used in this study, which is commonly known as Panzar and Rosse (PR) model. The Table 1 shows that the H-statistic for all the select banks is found to be 0.782. Since the value of H - statistic lies between 0 and 1, the market structure of Indian commercial banks during 1999-2013 is found to be monopolistic competition. Our result is consistent with the results of earlier studies in India as well as studies in other developing countries (Arrawatia & Misra, 2012 ; Gelos & Roldos , 2004 ; Levy-Yeyati & Micco, 2007; Prasad & Ghosh, 2005 ; Saeed, Matthews, & Khabari, 2006 ; Varhegyi, 2004). As far as the competition between Indian public sector and private sector banks is concerned, the results reveal that the degree of competition in private sector banks (0.481) is considerably lower than that of public sector banks (0.855). One possible reason for lower competition for private sector banks may be due to less use of technology by old private sector banks in India. In the present competitive dynamic environment, all the public sector banks and new private sector banks widely use technology to provide core banking and other retail banking services to the customers. But in case of old private sector banks, they have to improvise their use of technology.

(2) Regression Results : The Table 2 shows the results of model 2 and model 3 for all the banks considered here. A look into the Table reveals that the coefficient of *COMPT* is negative and significant for both the models. This implies that the degree of competition has a significant negative influence on the financial soundness of the Indian banking sector. Our results, thus, support the 'competition fragility' view and are consistent with the findings of Keeley (1990) ; Demsetz et al. (1996); Carletti and Hartmann (2002) ; Allen and Gale, (2004); Beck, Coyle, Dewatripont, Freixas, and Seabright (2010) ; Fungáčová, Solanko, and Weill, (2010); Anginer et al. (2012) ; and Matsuoka (2013). However, results contradict the findings of Schaeck et al., (2009); Boyd et al., (2007) ; Beck, Demirguc-Kunt, and Levine (2006) , where these studies support the 'competition-stability' view .

On the other hand, the coefficient estimate of *CCE* is positive and significant when the banks' soundness is measured by *ROA*. The implication of this positive influence is that by maintaining good relation with the customers, a bank can improve its profitability. However, the impact of *CCE* on *MBR* is insignificant, almost zero. This is contrary to the theoretical expectation. From the descriptive statistics, it has been observed that the distribution of *MBR* is highly skewed. Since, the classical linear regression model is sensitive to the existence of

Table 2. Fixed Effects Regression Results for all Banks

Model	Variables	Coefficient	*t*-statistic	*p*-value	Adj. R^2	*F*-statistic	VIF
Model 2	Constant	0.181	4.027	0.000	0.391	9.933***	-
	COMPT	-0.094	-2.270	0.023			1.026
	CCE	0.086	3.975	0.000			1.050
	SPREAD	0.113	3.436	0.000			1.002
	SIZE	0.120	1.960	0.050			1.035
Model 3	Constant	-1.810	-4.216	0.000	0.604	22.15***	-
	COMPT	-0.598	-4.353	0.000			1.026
	CCE	-0.000	-0.001	0.998			1.050
	SPREAD	-0.664	-0.567	0.570			1.002
	SIZE	0.298	8.234	0.000			1.035

Notes: *** indicates significant at 1% level by two-tailed test; dependent variable –ROA (model 2),MBR (model 3)

ROA- Return on Assets (profitability), MBR- Market to book value ratio, COMPT- Degree of Competition, CCE- Customer Capital Efficiency, SPREAD- Interest Spread, SIZE- Size of the bank

Table 3. Fixed Effects Regression Results for Public Sector Banks

Model	Variables	Coefficient	*t*-statistic	*p*-value	Adj. R^2	*F*-statistic	VIF
Model 2	Constant	0.958	8.772	0.000	0.287	6.566***	--
	COMPT	-0.542	-3.996	0.000			1.050
	CCE	1.181	4.219	0.000			1.052
	SPREAD	4.660	2.796	0.005			1.008
Model 3	Constant	0.806	33.982	0.000	0.428	11.341***	--
	COMPT	-0.114	-4.583	0.000			1.050
	CCE	0.219	7.572	0.000			1.052
	SIZE	0.184	5.326	0.000			1.008

Notes: *** indicates significant at 1% level by two-tailed test; dependent variable – ROA (model 2), MBR (model 3); For control variables, only significant results are finally reported.

ROA- Return on Assets (profitability), MBR- Market to book value ratio, COMPT- Degree of Competition, CCE- Customer Capital Efficiency, SPREAD- Interest Spread, SIZE- Size of the bank

Table 4. Fixed Effects Regression Results for Private Sector Banks

Model	Variables	Coefficients	*t*-statistics	*p*-value	Adj. R^2	*F*-statistic	VIF
Model 2	Constant	1.024	6.353	0.000	0.436	11.20***	--
	COMPT	0.200	0.860	0.390			1.032
	CCE	0.342	2.615	0.009			1.047
	SPREAD	3.812	2.462	0.014			1.015
Model 3	Constant	0.001	-0.011	1.000	0.553	17.325***	--
	COMPT	-0.167	-3.561	0.000			1.032
	CCE	-0.157	-2.356	0.019			1.047
	SIZE	0.088	1.939	0.086			1.015

Notes: *** indicates significant at the 1% level by two-tailed test; dependent variable – ROA (model 2), MBR (model 3); For control variables, only significant results are finally reported.

ROA- Return on Assets (profitability), MBR- Market to book value ratio, COMPT- Degree of Competition, CCE- Customer Capital Efficiency, SPREAD- Interest Spread, SIZE- Size of the bank.

outliers, the results are not tenable and further robustness check is required before drawing any conclusions. The coefficient of *SIZE* is positive and significant for both the models. The positive association between size and bank soundness indicates that the larger the size of the bank, the better the bank performance, which ultimately enhances financial soundness. This result is consistent with the results of Devanadhen (2013), who found that large size banks performed better in a competitive market as compared to small size banks. However, mixed results are found regarding the influence of *SPREAD* on financial soundness of banks. While the impact of *SPREAD* is positive and significant for model 2, which implies that an increase in bank's interest income will result in an increase in the profitability, however, an insignificant association is observed for the model 3.

The impact of competition on the financial soundness of Indian public sector banks and private sector banks separately are shown in the Table 3 and Table 4, respectively. In case of public sector banks, the coefficient estimate of competition *(COMPT)* is negative, and the results are significant at the 1% level for both the measures of financial soundness. The results, thus, support the findings of all banks as shown in the Table 2. However, contradictory results are found in case of Indian listed private sector banks. While the impact of *COMPT* on

market-to-book ratio (model 3) is negative and significant, such an association is found to be insignificantly positive when the banks' soundness is measured by *ROA* (model 2). But the influence of *CCE* on bank soundness is positive and significant for both the bank groups. This clearly demonstrates the importance of relation with others for enhancing bank soundness in a competitive environment. For the two control variables, as shown in model 2 and 3, finally, we have included only the significant variables in the models and the results indicate that both *SPREAD* and *SIZE* are positively associated with bank soundness. The observed adjusted R^2 and *F*-statistic for all run of the models are quite satisfactory to speak in favour of the appropriateness of the regression models used in the present context to examine the impact of competition on the soundness of Indian banks. Likewise, the values of variance inflation factor (VIF) indicate that the multicollinearity is not a serious problem for the present data set.

(3) Further Robustness Check : The standard linear regression based on the conditional mean function $E\,[Y / \overline{X} = \overline{x}]$ may provide a biased view of the relationship if the distribution of residuals is skewed since it is sensitive to the outliers. As already we have observed that the distribution of *MBR* is skewed for all banks and for private sector banks. To check the robustness of the results obtained by employing fixed effects model, we have employed quantile regression (Koenker & Bassett, 1978) at 50th percentile ($\theta = 0.5$), which is equivalent to least absolute deviation (LAD) regression or median regression. The quantile regression is more acceptable as it is more robust to non-normal errors and outliers (Buchinsky, 1998). The general form of the quantile regression (Buchinsky, 1998) is:

$$y_i = x'_i \beta_\theta + \varepsilon_{\theta i}\,;\; quant_\theta (y_i / x_i) = x'_i \beta_\theta$$

where, $quant_\theta (y_i / x_i)$ denotes conditional quantile of y_i, conditional on the regressor vector x_i. As an alternative to mean regression, we have considered $\theta = 0.5$ here, although θ can take any value between 0 and 1.

The results of quantile regression for models 2 and 3 are shown in the Table 5 and Table 6, respectively for all banks and for private sector banks. The results of quantile regression for the combined data (Table 5) also exhibits the negative influence of *COMPT* on financial soundness. The observed results advocate in favour of 'competition

Table 5. Quantile Estimates for all the Banks

Model	Variables	Coefficients	*t*-statistics	*p*-value
Model 2	Constant	1.157	37.328	0.000
	COMPT	-0.090	-3.050	0.001
	CCE	0.087	8.239	0.000
	SPREAD	0.262	12.381	0.000
	SIZE	0.094	1.813	0.097
Model 3	Constant	-0.0841	-4.701	0.000
	COMPT	-0.7032	-6.983	0.000
	CCE	1.2918	22.037	0.000
	SPREAD	-0.8090	-1.014	0.310
	SIZE	0.1631	10.943	0.000

Note: Dependent variable – ROA (model 2), M/B (model 3)

ROA- Return on Assets (profitability), MBR- Market to book value ratio, COMPT- Degree of Competition, CCE- Customer Capital Efficiency, SPREAD- Interest Spread, SIZE- Size of the bank

Table 6. Quantile Estimates for Private Sector Banks

Model	Variables	Coefficients	*t*-statistics	*p*-value
Model 2	Constant	0.995	8.702	0.000
	COMPT	-0.361	-1.969	0.050
	CCE	0.245	3.239	0.001
	SPREAD	19.428	17.534	0.000
Model 3	Constant	0.806	-8.075	0.000
	COMPT	-0.114	-3.311	0.001
	CCE	0.219	9.177	0.000
	SIZE	0.184	10.077	0.000

Notes: Dependent variable – ROA (model 2), M/B (model 3); Variables of table 3 are included here.

ROA- Return on Assets (profitability), MBR- Market to book value ratio, COMPT- Degree of Competition, CCE- Customer Capital Efficiency, SPREAD- Interest Spread, SIZE- Size of the bank.

fragility' view in the Indian context. Thus, the results support the results of fixed effect regression model. But the impact of *CCE* on *MBR* is found to be significant and positive by employing quantile regression. Thus the results of robust regression indicate that the relationship with customers has a direct positive impact on the soundness of Indian banks. In case of public sector banks also (Table 6), the coefficient of *COMPT* for model 2 is negative and significant. This also indicates that the "competition fragility" view is tenable for Indian banks. Further, the impact of *SIZE* on *MBR* is positive and significant at the 1% level.

Conclusion, Implications, Limitations, and Scope for Further Research

The present study is a modest attempt to investigate the impact of competition on the financial soundness of listed Indian commercial banks during 1998-99 to 2012-13. By employing PRH statistic to measure the degree of competition in the Indian banking sector, the study finds that the Indian banks are working in a monopolistic free market structure and the degree of competition in public sectors banks is more than that of private sector banks. Regarding the influence of competition on banks' financial soundness, our results show that the competition is inversely associated with the banks' financial soundness. The findings, thus, support the traditional 'competition fragility' view that states that in a tough competitive environment, banks are forced to take more risks that lead to financial instability. Again, the positive influence of customer capital efficiency *(CCE)* on financial soundness of banks implies that by maintaining a sound relationship with customers, a bank can enhance its financial soundness. The role of this intangible factor on bank soundness is an added contribution of this paper for policy makers.

The findings of the present study have some useful policy implications. First, although the market structure of Indian banking sector is monopolistic competition, but the degree of competition is very high. In this scenario, the negative and significant impact of competition on *ROA* and *MBR* suggests that higher degree of competition results in lower profitability and market value. As competition adversely affects the financial soundness of banks, appropriate strategies should be implemented to enhance the financial soundness of the banks. This can be done by minimizing the credit risk through proper assessment and interpretation of all sorts of internal and external factors from the loan origination phase to the servicing of accounts phase. By reducing the level of NPAs, banks can utilize the capital more efficiently because reduction of risky assets entails relatively lower amount of regulatory capital. Second, the customer capital efficiency *(CCE)* has a positive influence on both profitability and market

value. The implication of this positive influence is that by maintaining good relations with the customers, Indian banks can improve their profitability as well as the market value, which will ultimately enhance the financial soundness of the Indian banking sector in a competitive market. Third, both *SPREAD* and *SIZE* are positively associated with bank soundness, which suggests that increase in interest spread will enhance the financial soundness. As far as bank size is concerned, the larger banks have the ability to outperform in a competitive market which in turn improves the financial health of the Indian banks.

The present study is limited to listed Indian commercial banks only. Considering this limitation, further studies can be conducted with the help of the Indian banking sector as a whole and by including data from banking sector of similar emerging market economies. The present effort can be extended further by incorporating the bank capital ratio. Preservation of risk-based capital ratio as per the Basel norms is mandatory for all banks. High competitive environment entails banks to increase the capital base in order to provide adequate protection against unexpected losses and declines in the value of assets. Again, the higher the capital ratio, the lower will be the resources available for investment, which may reduce the profitability. Thus, studying the association of the three interrelated factors – competition, capital ratio, and financial soundness by employing an appropriate methodology may provide better insights about the existing scenario of the Indian banking sector. Further analysis can also be done by segregating the study period into Basel I and Basel II periods.

References

Allen, F., & Gale, D. (2004). Competition and financial stability. *Journal of Money, Credit and Banking, 36* (3), 453-480.

Anginer, D., Demirguc-Kunt, A., & Zhu, M. (2012). *How does bank competition affect systemic stability?* World Bank e-Library. DOI : http://dx.doi.org/10.1596/1813-9450-5981

Arrawatis, R., & Misra, A. (2012). Assessment of competition in Indian banking. *European Journal of Business and Management, 4* (20), 159 - 169.

Beck, T. A., Demirguc-Kunt, A., & Levine, R. (2006). Bank concentration, competition, and crises : First results. *Journal of Banking and Finance, 30* (5), 1581-1603.

Beck, T., Coyle, D., Dewatripont, M., Freixas, X., & Seabright, P. (2010). *Bailing out the banks: Reconciling stability and competition- An analysis of state-supported schemes for financial institutions.* London: Centre for Economic Policy Research.

Beck, T., De Jonghe O., & Schepens G. (2013). Bank competition and stability: Cross-country heterogeneity. *Journal of Financial Intermediation, 22* (2), 218-244.

Berger, A.N., Klapper, L.F., & Turk-Ariss, R. (2009). Bank competition and financial stability. *Journal of Financial Service Research, 35* (2), 99-118.

Bharathi, N. (2010). Profitability performance of new private sector banks - An empirical study. *Indian Journal of Finance, 4* (3), 16-24.

Bikker, J. A., & Haaf, K. (2002). Competition, concentration and their relationship: An empirical analysis of the banking industry. *Journal of Banking and Finance, 26* (11), 2191-2214.

Bikker, J.A., & Groeneveld, J. M. (1998). *Competition and concentration in the EU banking industry* (Vol. 8). De Nederlandsche Bank NV.

Boyd, J. H., & Nicolo, G. D. (2005). The theory of bank risk taking and competition revisited. *Journal of Finance, 60* (3), 1329 - 1343.

Boyd, J. H., De Nicolo, G., & Jalal, A. M. (2007). *Bank risk-taking and competition revisited: New theory and new evidence* (IMF Working Papers No. 06/297). Retrieved from https://www.imf.org/external/pubs/ft/wp/2006/wp06297.pdf

Buchinsky, M. (1998). Recent advances in quantile regression models: A practical guideline for empirical research. *Journal of Human Resource, 33*(1), 88-126.

Carletti, E., & Hartmann, P. (2002). *Competition and stability : What's special about banking?* European Central Bank (ECB) Working Paper No. 146. Retrieved from http://www.suomenpankki.fi/pdf/104857.pdf

Chen, M.C., Cheng, S.J., & Hawang, Y. (2005). An empirical investigation on the relationship between intellectual capital and firms' market value and financial performance. *Journal of Intellectual Capital, 6* (2), 159-76.

Claessens, S., & Laeven, L. (2004). What drives bank competition? Some international evidence. *Journal of Money, Credit, and Banking, 36* (3), 563-583.

Dalkir, K. (2005). *Knowledge management in theory and practice.* Oxford, UK : Elsevier Butterworth–Heinemann.

De Nicolo, G., & Loukoianova, E. (2007). *Bank ownership, market structure and risk.* Retrieved from http://ssrn.com/abstract=1033208

Demetz, R., Saidenberg, M., & Strahan, P. (1996). Banks with something to loose: The disciplinary role of franchise value. *Federal Reserve Bank of New York Economic Policy Review, 2* (2), 1-14.

Devanadhen, K. (2013). Performance evaluation of large-size commercial banks in India. *Indian Journal of Finance, 7*(1), 5-16.

Edvinsson, L., & Malone, M.S. (1997). *Intellectual capital: Realizing your company's true value by finding its hidden brainpower*. New York, NY : Harper Business.

Fungáčová, Z., Solanko, L., & Weill, L. (2010). *Market power in the Russian banking industry.* DOI : http://dx.doi.org/10.2139/ssrn.1578247

Gelos, G. R., & Roldos, J. (2004). Consolidation and market structure in emerging market banking systems. *Emerging Market Review, 5* (1), 39-59.

Ghosh, S., Nachane, D.M., Narain, A., & Sahoo, S. (2003). Capital requirements and bank behavior: An empirical analysis of Indian public sector banks. *Journal of International Development, 15* (2), 145-156.

Ghosh, S.K., & Maji, S.G. (2015). Empirical validity of value added intellectual coefficient model in Indian knowledge-based sector. *Global Business Review, 16* (6), 1-16. DOI: 10.1177/0972150915597597.

Gupta, N. L., & Mehta, M. (2011). Indian banks and Basel-II: An econometric analysis. *Indian Journal of Finance, 5* (6), 11-19.

Keeley, M.C. (1990). Deposit insurance, risk and market power in banking. *American Economic Review, 80* (5), 1183-1200.

Kick, T., & Prieto, E. (2015). Bank risk and competition: Evidence from regional banking markets. *Review of Finance, 19* (3), 1185-1222.

Koenker, R., & Bassett, G. (1978). Regression quantiles. *Econometrica, 46* (1), 33-50.

Levy-Yeyati, E., & Micco, A. (2007). Concentration and foreign penetration in Latin American banking sectors: Impact on competition and risk. *Journal of Banking and Finance, 31*(6), 1633-1647.

Lopez-Espinosa, G., Rubia, A., Valderrama, L., & Anton, M. (2013). Good for one, bad for all: Determinants of individual versus systemic risk. *Journal of Financial Stability, 9* (3), 287-299.

Maji, S. G., & Goswami, M. (2014). The journey of IC research: Reflections from the past two decades. *Asian Journal of Research in Banking and Finance, 5* (6), 85-102.

Maji, S.G., & Dey, S. (2012). Credit and insolvency risks of Indian commercial banks: Do size and capitalization matter. *JM International Journal of Finance, 2* (1), 47-59.

Maji, S.G., & De, U.K. (2015). Regulatory capital and risk of Indian banks: A simultaneous equation approach. *Journal of Financial Economic Policy, 7* (2), 140 – 156.

Maji, S.G., & Hazarika, P. (2014). Competition in the Indian banking sector: A panel data analysis. In V.S. Adigal & M. K. Mehta (Eds.), *Changing finance and economic perspectives: Proceedings of an International Conference* held in Ranch University, Jharkhand, 11-12 July, 2014 (pp. 287-296). New Delhi : Bharti Publications.

Marcus, A. (1984). Deregulation and bank financial policy. *Journal of Banking and Finance, 8* (4), 557-65.

Matsuoka, T. (2013). Sunspot bank runs in competitive versus monopolistic banking systems. *Economics Letters, 118* (2), 247 - 249.

Maudos, J. (2012). Financial soundness indicators for the Spanish banking sector: An international comparison. *Spanish Economic and Financial Outlook, 1*(4), 24-32.

Molyneux, P., Lloyd-Williams, D.M., & Thornton, J. (1994). Competitive conditions in European banking. *Journal of Banking and Finance, 18* (3), 445-459.

Moorhouse, A. (2004). An introduction to financial soundness indicators. *Monetary & Financial Statistics.* Retrieved from http://www.bankofengland.co.uk/statistics/Documents/ms/articles/art1feb04.pdf

Murali S., & Subbukrishna K.R. (2008). *New capital framework in India: Bank credit management.* Mumbai : Himalaya Publishing House.

Navajas, M. C., & Thegeya, A. (2013). *Financial soundness indicators and banking crises*. IMF Working Paper/13/263. Retrieved from https://www.imf.org/external/pubs/ft/wp/2013/wp13263.pdf

Nazari, J.A., & Herremans, I.M. (2007). Extended VAIC model: Measuring intellectual capital components. *Journal of Intellectual Capital, 8* (4), 595-609.

Panzar, J., & Rosse, J. (1987). Testing for 'monopoly' equilibrium. *Journal of Industrial Economics, 35* (4), 443 - 456.

Pascha, M.A., Srivenkataramana, T., & Swami, K. (2012). Basel II norms with special emphasis on capital adequacy ratio of Indian banks. *A Journal of M P Birla Institute of Management, 6* (1), 23-40.

Powłowska, M. (2012). *Competition, concentration and foreign capital in the polish banking sector (prior and during the financial crisis)*. National Bank of Poland Working Paper No. 130. National Bank of Poland, Economic Institute.

Prasad, A., & Ghosh, S. (2005). *Competition in Indian banking* (IMF Working Paper, WP/05/141). Retrieved from: https://www.imf.org/external/pubs/ft/wp/2005/wp05141.pdf

Rao, K.N. (2005). *The new Basel accord*. Hyderabad : ICFAI University Press.

Saeed, A. -M., Matthews, K., & Khabari, Y. (2006). Market structure and competitive conditions in the Arab GCC banking system. *Journal of Banking and Finance, 30* (12), 3487-3501.

Schaeck, K., & Cihak, M. (2007). *Banking competition and capital ratios* (IMF Working Paper No.07/216). 1-40. Retrieved from https://www.imf.org/external/pubs/ft/wp/2007/wp07216.pdf

Schaeck, K., & Cihak, M. (2010). *Competition, efficiency and soundness in banking: An industrial organization perspective*. European Banking Center, Discussion Paper No. 2010–20S. DOI : http://dx.doi.org/10.2139/ssrn.1635245

Schaeck, K., Cihak M., & Wolfe, S. (2009). Are competitive banking systems more stable? *Journal of Money, Credit and Banking, 41*(4), 711 - 734.

Simpasa, A. M. (2013). *The performance of Zambian commercial banks in the post-reform period: Evidence of efficiency, competition and market power*. African Development Bank Group, Working Paper No. 168. Retrieved from: http:/www.afdb.org/

Stanek, R. (2012). Competition and risk-taking in banking industry. *Journal of Financial Assets and Investing*. Retrieved from http://is.muni.cz/do/econ/soubory/aktivity/fai/31053132/FAI_issue2012_01 stanek.pdf.

Stewart, T. (1997). *Intellectual capital: The new wealth of nations*. New York, NY : Doubleday Dell Publishing Group.

Tabak, B. M., Laiz, M. T., & Cajueiro, D. O. (2013). Financial stability and monetary policy - The case of Brazil. *Revista Brasileira de Economia, 67* (4), 403-413.

Trembovetskyi, V. (2010). *Testing for competition in banking sector: Evidence from Ukraine*. Retrieved from http://www.kse.org.ua/uploads/THESIS%20Trembovetskyi.pdf

Turk-Ariss, R. (2010). On the implications of market power in banking: Evidence from developing countries. *Journal of Banking and Finance, 34* (4), 765-775.

Varhegyi, E. (2004). Bank competition in Hungary. *Acta Oeconomica, 54* (4), 403-424.