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Relationship between Market Structure, Efficiency and Performance in Indian Banking Industry

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Abstract

Recent changes in the banking business due to technological innovation, value creation, concentration and increased competition have all aimed to improve productivity and efficiency in banks. Keeping in view the changing landscape, Reserve Bank of India (RBI) has also been focusing on a globally competitive and robust banking sector in India. In this changing context, the major challenge before policy makers has been to allow development of appropriate institutional structures that would respond to challenges posed by an open and liberalized financial regime. Using data of scheduled commercial banks in India for the year 2013-14, two competing structural hypotheses explaining the relationship between performance and market concentration are tested in this paper. The empirical results reject the traditional structure conduct performance (SCP) hypothesis, instead making a case for efficient structure hypothesis. This is to say that efficient operation of banking firms is vital for having higher profitability in case of India. No evidence is however found to support the two intervening hypotheses. Further, size and ownership structure are also found to be variables significantly impacting the performance of banks.

Keywords: Productivity, Efficiency, Size, Ownership structure

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1. INTRODUCTION

The last decade has seen a rapid transformation in the Indian banking sector. The recent changes in the banking business due to technological innovation, value creation, concentration and increased competition have all aimed to improve productivity and efficiency in banks. Keeping in view the changing landscape, RBI has also been focusing on a globally competitive and robust banking sector in India. In this changing context, the major challenge before policy makers has been to allow development of appropriate institutional structures that would respond to challenges posed by an open and liberalized financial regime. Also, it has been emphasizing on financial inclusion, whereby banking services are accessed easily by the underprivileged sections of the society. Mr. Raghuram Rajan, Governor RBI, has recognized that strong national institutions are hard to build and thus the existing ones should be nurtured from the outside, and constantly rejuvenated from the inside, for there are precious few of them. (Times of India, 3rd April, 2015). These trends may however create a public policy concern about the degree of concentration in banking market. With this context in the background, the relationship between market structure, efficiency and performance assumes importance.

Two competing structural hypotheses explaining the relationship between performance and market concentration are Structure-Conduct-Performance (SCP) paradigm and Efficient Structure (EFS) hypothesis. The SCP postulates that fewer and larger firms (indicating higher concentration) are most likely to engage in anti-competitive conduct. Banks are able to generate higher profits when they collude and gain monopoly power in being able to set high prices. Alternatively, the EFS asserts that banks, with large size, are more efficient, thus boosting their performance. Accordingly, the levels of concentration and efficiency can be studied to see its impact on market structure of banking industry and banks' performance. The objective of the present study is to test the above-mentioned hypotheses in the Indian banking sector. Two intermediate hypotheses shall also be tested – Modified efficient structure hypothesis and Hybrid of efficient structure and traditional SCP (developed by Schmalensee, 1987). The modified efficient structure hypothesis asserts that performance is a function of efficiency as well as market share. Alternatively, the hybrid hypothesis states that it is both, efficiency as well as concentration, which influence performance.

Apart from being within an institutional setting of an emerging economy, the Indian banking industry provides a suitable testing ground for several reasons. First, it is characterized by the existence of both public and private banks in a largely deregulated and an increasingly competitive environment. Second, the banking industry provides a test for performance differentials not only between public and private enterprises but also between different types of private ownership, foreign and domestic. A comparison across the entire spectrum of ownership forms can give important insights into the factors responsible for emerging trends. Further, Indian banking industry is highly concentrated. The public sector banks (SBI group and nationalised banks) occupy a dominant position in the market. As per RBI statistics, more than 70% of assets and deposits were held by PSBs in 2013-14. (Figure 1 and 2). Finally, such a study would provide insights with respect to an industry in which mergers have become an important policy issue.

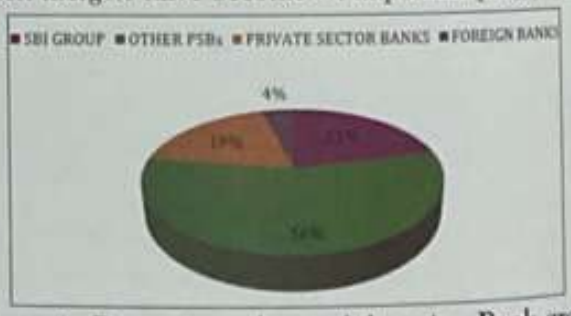

Figure 1: Percentage share of deposits- Bank group wise 2013-14

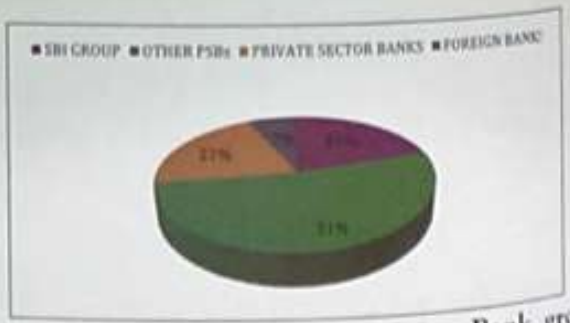

Figure 2: Percentage share of assets-Bank group wise 2013-14

The rest of the paper is organized as follows. The second section provides a review of literature. Section 3 describes the research design and methodology and empirical results are presented in section 4. Section 5 presents the major conclusions of the study and recommendations.

2. REVIEW OF LITERATURE

The objective of current review of literature is to examine the research methodologies employed in the past and the conclusions derived therefrom in various studies on market concentration, efficiency and performance in banking sector. Different studies in the past have used two alternate approaches to study bank behaviour – structural approach and non-structural approach. Structural approach finds its basis in the traditional industrial organizational theory. Herein, two competing hypotheses are used to explain the relationship between bank performance and market concentration - Structure-Conduct-Performance (SCP) paradigm and Efficient Structure (EFS) hypothesis.

It is observed that a majority of the studies on SCP in banking relate to US and European markets. Gilbert (1984), in his survey reports that out of 44 studies reviewed on the US banking industry, 32 studies have found support for traditional SCP paradigm. Notable amongst them have been Berger and Hannan (1997, 1998), Rhoades (1982) etc. While its theoretical foundations are well established, the applicability of SCP to banking firms is not rigorously justified. The alternative theory - efficient structure hypothesis, proposed by Demsetz (1973), has found support with authors such as McGee (1974), Jovanovic (1982), Brozen (1971), Evanoff and Fortier (1988), Berger (1995), Smirlock (1985), etc. The study by Maudos (1996) found results supporting the modified efficient structure hypothesis.

While a large number of studies have examined the impact of market structure and efficiency on performance, much systematic research as yet is needed for emerging market economies. The study by Gelos and Roldos (2002) discusses the main forces shaping bank consolidation in major emerging markets and describes the patterns of consolidation and concentration using traditional indicators of market structure. The study of banking industry of Sri Lanka by Lalith Seelanatha (2010) shows that performance does not depend either on market concentration or market power, but rather on the level of efficiency of the banking units. Ye, Xu and Fang (2012) tested for alternative structural hypotheses using panel data of 14 largest banks in China, concluding that neither SCP nor EFS holds true in case of China. They found a strong support for relative market power hypothesis, highlighting the role of product differentiation and market share driving bank profits. Indian banking has been an area of research by numerous scholars in the past. Notable amongst these have Sarkar, Sarkar and Bhaumik (1996), Bhattacharya and Das (2003), Sathye and Sathye (2004), Sahoo and Mishra (2012) etc. Bhattacharya and Das (2003) examined the nature and extent of changes in market concentration and its possible implications on prices and output of banking services. The paper finds a strong evidence of change in market structure of the banking sector and reveals that a major part of change occurred during the early 1990s. Sahoo and Mishra (2012) took the panel data set of Indian banks during 1999-2009 and suggested towards strong inter-linkages amongst structure, conduct and financial performance of banks.

However, dramatic changes taking place in Indian financial landscape sharply limits the significance of past literature for current policy decisions. The present study thus seeks to provide a fresh perspective using the data for SCBs in India for the year 2013-14.

3. RESEARCH DESIGN

This section seeks to provide a framework for testing whether the banking market in India is collusive or efficient. On the basis of knowledge gained by reviewing some important research efforts made in the past and an exploratory examination of the reports published by RBI, the research design is developed and presented. The following regression model is being estimated.

$$ROA = \alpha_i + \beta_1 HHI_i + \beta_2 EFF_i + \beta_3 DEPMKTSH_i + \beta_4 LOGASS_i + \beta_5 OWNDUM_i + e_i$$

We now define the dependent and independent variables as used in the study.

3.1 *Profitability*

Return on assets (ROA) is a measure of profitability used in analysis. It is a widely used measure and finds support with authors such as Rhoades (1985), Evanoff and Fortier (1988) etc. It indicates how profitable a company is relative to its total assets.

3.2 *Market concentration*

The importance of market concentration finds its theoretical justification in Structure – Conduct – Performance (SCP) paradigm (Bain 1951), which postulates that fewer and larger firms are more likely to engage in anti-competitive conduct. Hirschman-Herfindahl index (HHI) has been the most widely used measure of concentration by researchers as well as regulators. It is defined as the sum of squared market shares of all banks in the market. Being a summary measure, the structural changes in all parts of the distribution influence the value of concentration index. The current analysis computes HHI index based on market share of each bank in asset market. A significant positive correlation between profitability and market concentration would indicate that there is not enough competition and firms are able to extract higher profits because of collusive arrangements. In such a case, merger proposals would need to be very carefully analysed before being approved.

3.3 *Efficiency*

Efficient structure hypothesis alternately postulates that higher profits are generated when big firms with lower costs are more efficient than other firms in the market. The X-efficiency scores for individual banks are calculated using Data Envelopment Analysis (DEA). It is calculated by minimizing the ratio of weighted inputs to weighted outputs for a decision making unit (DMU), subject to a condition that similar ratios for all other DMUs be less than or equal to one. Here, each individual bank is treated as a DMU. The DEA measure compares each of the banks in the sample with the best practice in the sample and is thus a direct measure of efficiency. Following Berger et al (1989, 1993, 1994), the inputs used in the study for calculation of X-efficiency scores are interest expenses and non-interest expenses, while outputs used are interest income and non-interest income. This measure is expected to have a positive and significant coefficient if efficient structure hypothesis is to hold true.

3.4 *Market share*

Market share of the bank is a variable used to account for characteristics of banks other than the efficiency. The deposits held by banks have been used to capture the market share variable (DEPMKTSH) in the present paper.

3.5 *Size*

Following the earlier studies (Goldberg et al 1996, Smirlock and Michael, 1985) bank's size is used to account for banks' diversification ability. If large banks were able to capture significant cost advantages over small banks, banks size should be positively related to the profitability. The total assets of the banks are accordingly taken as a proxy for size in our model. We use log of total assets (LOGASS) in our regression equation.

3.6 *Ownership*

Ownership structure may be assumed to have a limiting effect on the decision making capabilities of banks especially the state-owned banks. Several previous studies being reviewed have shown that privately owned banks are seen to have relatively more freedom to set firms' operational policies and procedures. It may accordingly indicate towards a positive influence of private ownership on bank's profitability. Thus the impact of ownership is accounted for by introducing a dummy variable (OWNDUM). The variable takes the value '0' if the bank is a public sector bank (which includes SBI group and nationalised banks) and '1' if bank is a private bank (including foreign banks).

Table 1 provides the variable names along with the symbols used.

The annual data is collected for all scheduled commercial banks in India for the year 2013-14. The total number of observations is 90. United Bank of Switzerland (UBS) AG bank is however excluded from the study on account of missing data. Thus the total banks finally included in the study are 89. The data is collected from an annual RBI publication – Statistical tables relating to banks

in India. Before regression is run to estimate the parameters, the usual checks are done.

Table 1: Variable names and symbols

Variable name	Symbol used
Return on assets	ROA
Herfindahl Hirschman index (measure of concentration)	HHI
X-efficiency scores using DEA analysis	EFF
Deposit market share	DEPMKTSH
Log of total assets	LOGASS
Ownership dummy	OWNDUM

4. EMPIRICAL RESULTS AND DISCUSSION

In this section we present the findings of the empirical analysis. First we review the descriptive statistics and correlation coefficient of data related to variables used in the analysis. Later we present the results of the analysis.

4.1 Descriptive Statistics

Tables 2 and 3 present descriptive statistics and correlation coefficients respectively, testing normality and correlation among the independent and dependent variables.

Table 2: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Median
ROA	89	-6.570000	5.280000	0.907978	1.613020	0.880000
LOGASS	89	2.841779	7.253395	5.285237	1.086123	5.458766
EFF	89	0.008074	1.000000	0.187453	0.343410	0.008074
HHI	89	4.01E-07	267.2350	5.832848	28.86457	0.068807
DEPMKTSH	89	6.68E-07	16.34110	1.123596	2.173717	0.217656

Table 3: Correlation amongst variables

	DEPMKTSH	EFF	HHI	LOGASS
DEPMKTSH	1.000000			
EFF	-0.278862	1.000000		
HHI	0.874682	-0.111094	1.000000	
LOGASS	0.608987	-0.664504	0.311998	1.000000

The standard deviation of the data shows large statistical dispersion in the data used indicating that the data points are spread over a wide range of values and are highly variable (Table 2). Amongst the variables studied, we find that the maximum variability is observed for only one - the HHI index. Table 3 presents the results of the correlation among the independent variables. The multicollinearity is tested using Variance Inflation Factor (VIF). We find no problem of multicollinearity in the independent variables chosen for our analysis.

4.2 Results

The main research question raised in this paper is whether it is the market power (which results from high market concentration) or the firms' efficiency that is important in determining overall firm performance. Table 4 presents the regression results. The estimated coefficient for market concentration variable (HHI) in the model is not statistically different from zero. The result finds that market concentration does not have significant association with banks' profitability. Rather it is the independent variable, X-efficiency score (EFF), that is found influencing ROA positively and significantly at 1% level. This is suggestive of efficient structure hypothesis appropriately describing the Indian banking market. However, it also needs to be noted that the efficiency scores for many banks

are found to be considerably less than 1, suggesting towards the untapped potential to improve efficiency. The variables proxing for the other two hypotheses – Modified efficient structure (DEPMKTSH) and Hybrid – are also not found to be significantly related with ROA.

Table 4: Regression results

Variable	Coefficient	p – value
CONSTANT	-4.445094	0.0090**
HHI	0.001098	0.9431
EFF	2.335458	0.0006*
DEPMKTSH	-0.056435	0.8245
LOGASS	0.789247	0.0090*
OWNDUM	1.149727	0.0217**
R^2	0.173813	
ADJUSTED R^2	0.124043	
DURBIN WATSON STATISTIC	2.185817	
Observations	89	

** significant at 1% level, ** significant at 5% level, *** significant at 10% level*

The log of assets, being used as a proxy for size, also shows a positive and significant relationship with bank performance at 1% level. Also the ownership effect comes out to be statistically significant at 5% level.

Table 5: Heteroskedasticity test-White

F-statistic	1.442129	Prob. F(19,70)	0.1361
Obs R-squared	25.31858	Prob. Chi-Square(19)	0.1503
Scaled explained SS	101.9891	Prob. Chi-Square(19)	0.0000

The Durbin-Watson statistic is close to 2 indicating that there is no auto correlation in the residuals. Further, the result of White test (p-value of observed r squared is greater than 0.05) suggest that residuals are homoscedastic as presented in Table 5.

5. CONCLUSIONS AND RECOMMENDATIONS

In this paper, two alternate structural hypotheses explaining the relationship between performance and market concentration are tested in case of Indian banking. Confirming the major arguments raised by Molyneux (1999) against the profit-concentration relationship, the present study rejects the traditional SCP hypothesis. On the contrary, the empirical results point out that efficient operation of banking firms are vital for having higher profitability, making case for efficient structure hypothesis. No evidence was however found to support the two intervening hypotheses. Size and ownership structure are also found to be variables significantly impacting the performance of banks.

The results of this paper have certain key policy implications. One, in case of India, where mergers have become a major policy issue, efficiency hypothesis finding support, can put forward the case of mergers being looked upon favorably. Also, though it is generally asserted that deregulation and liberalization are aimed at making banking industry competitive, acceptance of efficiency hypothesis provides the empirical evidence for the same. However, in developing economies like India, banks still remain to be highly regulated and thus collusion may not be that easy and prompt. In such a case, product differentiation may play a key role in achieving the desired objectives. Further, in the last few years, non-performing assets (NPA) of banks, particularly those in public sector banks, have been rising due to stalled projects, sluggish domestic growth and slowdown in many parts of the global economy. NPA topped Rs. 3 lakh crore as on December 2014, of which Rs. 2.62 crore belong to nationalized banks alone. (Hindustan Times, 3rd April, 2015). Also, major developments are taking place in the financial architecture with RBI giving licenses to payment banks to further the goal of financial inclusion, government's announcement of setting up of Banks Board Bureau (BBB) to deal with governance issues, stressed assets and raising of capital by PSBs etc. In this scenario, significant policy changes to improve the efficiency and productivity of the banking industry gain utmost importance.

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