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Determinants of bank profits and its persistence in Indian Banks: A study in a dynamic panel data framework

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Abstract

The paper studies the impact of bank specific, industry specific and macroeconomic factors affecting profitability of Indian Banks in a dynamic model framework .The study uses panel data from 42 Indian Scheduled Commercial Banks for the period from 2000 to 2013 and addresses the problem of endogeneity of factors and persistence of bank profits by using Generalised Method of Moments (GMM).The study finds the presence of moderate degree of persistence of profits in Indian Banking Industry, implying that the product markets of Indian Banks are moderately competitive, less opaque due to asymmetry in information. Bank specific variables such as capital to assets ratio, operating efficiency and diversification have been found to be positively affecting the bank profits. Credit risk, measured by provisions for bad debts, negatively impacts the bank profitability. The study also finds evidence in support of the Structure conduct Hypothesis (SCP), using Herfindahl – Hirschman Index (HHI). Bank profits responds positively to the GDP growth, indicating that bank profits are pro-cyclical to the growth of economy whereas the increase in inflation rate affects bank profits negatively .It is observed that the crisis period did not make any significant effect on profitability of banks suggesting that Indian Banks in the last decade have been moving towards efficiency and dynamism.

Introduction

Liberalisation reforms in early 1990s not only revamped the banking structure but also gave a multifaceted boost to the economy as a whole. Thereafter, the banking system expanded rapidly and became diversified. Developing economies largely operate through the financial institutions and any damage caused by the financial instability of these institutions is a serious cause of concern.

In last two decades, the financial sector underwent significant changes ranging from interest rate deregulation to entry of foreign players in the market to stabilise fiscal deficit through investments. Sluggish growth momentum of the economy coupled with asset impairment has hindered the profitability of banks in the current phase. Sustained profitability of the banking sector is desired as it contributes to economic growth. A more efficient banking system can effectively mobilise and allocate resources for accelerating economic growth. Since the profitability of banks is one of the driving forces of capital, it is crucial to identify the factors which could cause possible dangers to it. The depletion in profitability of banks is more likely to affect the solvency ratios which ultimately threaten the economic system. The emerging Indian banking system and the turbulence in the Indian economy provide a strong case for studying factors responsible for bank profitability in detail. Academicians and regulatory authorities have always been interested in bank profitability studies so that they can take necessary steps to assess and manage risk for ensuring stability in the financial system.

The Financial Stability Report (2013) of RBI points out an increase in vulnerability of the banking stability Indicator (BSI)¹ since 2010. This makes a strong case for identifying the factors responsible for banks profitability in the current scenario.

Persistence in bank profits is defined as the tendency for an individual bank to retain the same place in the banking industry profit performance distribution. The level of bank profit persistence determines the degree of competitiveness of product market, informational asymmetry and sensitivity of bank profits to macroeconomic factors.

From the comparative chart given in Figure 1, it is evident that even though total earnings of banks significantly increased, there has not been a major increase in the profits of Indian Scheduled Commercial Banks in the last five years. This makes a case to study various determinants which are responsible for affecting the profitability of banks.

¹ FSR – June 2013 - with reference to data as at end March 2013

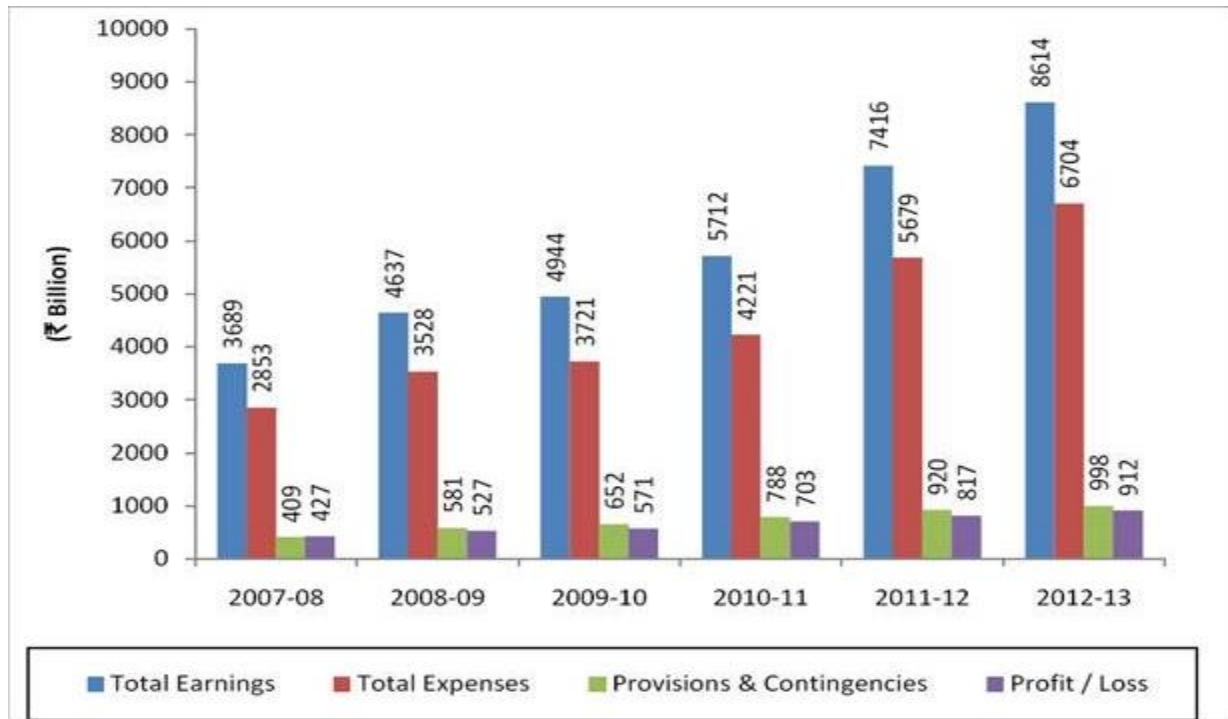


Figure 1: Earning and Expenses of Scheduled Commercial Banks

Source: RBI data on earnings and expenses

Banks today have moved away from their traditional banking activities. They are offering more diversified services since they face increased competition within the banking sector as well as from non banking companies and capital markets. Diversification of banking activities and relaxation to entry of new players in the market has amplified the level of competition. As a consequence, their sources of income generation have shifted from the traditional fund based activities to more fees and non fund based services and activities. These changes in the style of functioning of banks along with global slowdown have compelled us to continuously monitor banks profitability.

A decline in the quality of asset profile of banks is another major cause of concern. There has been an increase in the levels of substandard assets which adversely affects to the profit margins of banks. Therefore, analysis of these factors on banks profitability has also become an investigating issue.

In the past decade, bank consolidation through various mergers and acquisitions helped in rescuing distressed banks which led to higher efficiency and economies of scale .This has resulted in a considerably concentrated banking industry. This type of change in the market structure may intensify the power of larger banks as they may collude and hinder productivity. Therefore, we need to study the implications of these changes in the market structure which have taken place in the last decade.

The Indian Banking Industry comprises of 89 Scheduled Commercial Banks both domestic and foreign, comprising 51 banks of Indian Origin .We collected all available balanced panel data on 42 Indian origin scheduled commercial banks for the period 2000 to 2103 from the RBI, and Bloomberg and CMIE Prowess databases for the present study. We studied the impact of bank specific, industry specific and macroeconomic factors affecting profitability of Indian Banks in a dynamic model framework. The persistence of bank profits and endogeneity of the factors have been accounted for using GMM as suggested in Arellano & Bond,(1991).The study empirically test the various factors which determine the profitability of the Indian Scheduled Commercial banks and analyses their performance during different stages of the economic cycle over the last 14 years .

The paper is organised into 7 sections. Section 2 presents the literature review related to the study, Section 3 outlines the dependent and independent variables used in the study. Section 4 describes GMM methodology for dynamic panel data estimation, Section 5 outlines the data used. Section 6 presents the results of the empirical investigation and Section 7 concludes the study.

2. Theoretical Background

Literature review

The subject of banking sector performance has gained importance in recent years and abundant literature is available on the study of bank performance incorporating various explanatory factors examining the role of management of resources. Early researches in the area of bank profitability studies focused on Net Interest margin as the basic indicator of bank performance.

Various researchers concluded that net interest margin has a strong impact on the business cycle, Ho and Saunders (1981), Allen(1988), Demirguc-Kunt and Huizinga (2000). Progressively, the importance of net interest income is reducing over the years as non interest income in the form of commissions, fees and trading income now forms a substantial part of the income.

Bank profits are generally measured by Return on Assets which is a combined effect of determinants and external factors. Empirical research on the determinants of banks profitability have been using a panel of various countries (Bourke 1989; Molyneux & Thornton 1992; Demirguc-Kunt & Huizinga 2000; Bashir 2000; Bikker & Hu 2002; Abreu and Mendes 2002) while some studies consider specific countries (Berger et al. 1987; Berger 1995; Afanasieff et al. 2002; Angbazo 1997; Naceur & Goaid 2001; Guru 2002; Neely & Wheelock 1997; Barajas et al. 1999).These studies include external and internal determinants of bank profitability. Internal determinants are specific to the bank and under the

control of bank managements, whereas external determinants may include macroeconomic as well as industry specific factors.

One of the very pioneering works incorporating various determinants of profitability was done by Mark J. Flannery (1981) in which he investigated the impact of market rate variability on bank performance and found it to be negative. He added that most of the banks have effectively hedged themselves against any market rate risk which is the reason for its low significance. Demircurc, Kunt and Huizinga (1999) used bank level data for 80 countries from 1988 to 1995. They concluded that a large ratio of bank assets to GDP and low market concentration ratio leads to lower profits. They also compared foreign and domestic banks and concluded that foreign banks have higher margins and profits as compared to domestic banks in developing countries and, on the contrary, the opposite is true for developed countries.

Bourke (1989) used a pooled time series approach to regress measures of performance against various internal variables of bank profitability. Philip Molyneux et al. (1992) replicated Bourke's methodology and investigated the Edwards-Heggstad-Mingo hypothesis which accounts for risk avoidance by banks with high market power. They took a sample of European banks across eighteen countries.

Heffernan et al. (2008) investigated the performance of banks in China from 1999 to 2006 and concluded that bank size, foreign ownership and bank listings do not have any major effect on profitability. Jerome Coffinet et Al. (2013) proposed a stress testing methodology to analyse the sensitivity of banks to macroeconomic shocks for French Banks.

Credit risk is one of main factors which affect profitability of banks. A change in credit risk leads to a change in the bank's loan portfolio's strength which, in turn, affects its performance. Cooper et al. (2003) And Duca et al. (1990) indicate that larger exposure to credit risk is usually associated with decreased firm profitability. Miller et al. (1997) find that an exposure to high risk loans accumulates unpaid loans and decreases profitability. In recent studies, substandard assets (NPA) have also been included in the study of bank efficiency (e.g., Altunbas et al. 2000 and Girardone et al. 2004). Their results link inefficiency with higher level of bad assets. In general, it is explicitly assumed that increased exposure to credit risk leads to a decline in profitability (Athanasoglou et al. 2008; Hesse and Poghosyan 2009

Empirical studies by Bourke (1989), Demircurc-Kunt and Huizinga (1999), Abreu and Mendes (2002), Goddard et al. (2004), Pasiouras and Kosmidou (2007), and García-Herrero et al. (2009), point out that banks with higher profits maintain higher equity in comparison to their assets. According to them

excess capital acts as a cushion to absorb any adverse shocks in the economy. Repullo(2004), Athanasoglou et al. (2008). Other researchers argue/suggest that any bank having higher capital relative to its asset has lower funding costs and more capable of absorbing any adverse circumstances (Claeys and Vander Vennet (2008); Chortareas et al.(2011), whereas, in another scenario, higher equity can reduce the cost of capital and increase profits (Molyneux, 1993). However, according to the risk-return hypothesis (Curak et al. 2012) higher risks may also lower the profitability.

With respect to expenses, reduced expenses are positively related to performance which imply better cost decisions of the management, Athanasoglou et al. (2008), Bourke et al.(1989). However, some researches explore a positive relationship suggesting that the high expenses and high profits may be attributed to higher expenditure on human capital thus generating profits (Molyneux et al. 1993).

The size of a bank incorporates the effect of economies of scale. If economies of scale persist, it could lead to a positive relationship between size and profitability, Akhavein et al. (1997), Bourke (1989), Molyneux et al. (1992), Biker et al. (2002). Researchers have also concluded that cost savings can be achieved by increasing the size of the bank. Berger, Hanweck (1987), Boyd et al. (1993), Miller et al. (1997), Athanasoglou et al. (2008), and Eichengreen (2001) explore a non linear relationship between size and profitability.

Sensitivity of bank profitability to macroeconomic variables has assumed greater importance in the wake of the financial crisis. Neely (1997) suggests that per capita income has a strong positive effect on bank profitability. Demirguc-Kunt et al. (2001) and Biker et al. (2002) introduced the variable of business cycle and concluded that high correlation exists between the two. Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (1999), and Athanasoglou et al. (2008) point towards a positive relationship between inflation, GDP growth and bank profits.

To understand the impact of concentration on bank profits, the Structure-conduct-performance (SCP) hypothesis (market-power) points out that a higher market power will yield monopoly profits. Molyneux and Thornton (1992) indicate a positive and significant relationship with the profitability of a bank. Conversely, the researches by estimations by Berger (1995) and Mamatzakis and Remoundos (2003) oppose the SCP hypothesis.

With respect to earlier studies on the Indian Banking system, Verghese (1983) determined whether the new direction given to banks due to nationalisation in 1969 declined their profitability due to slackened productivity or not. Bodla (2006) did a multivariate regression analysis on determinants of Indian profitability and found a significant impact of operating expenses and non interest income on net

profits. Sharma and Bal (2010) analysed the changes in market concentration over the years and concluded that there has been a considerable increase in concentration ratios over the years, which points towards an increase in competition.

3. Dependent Variables: Return on Assets or Return on Equity

Profitability of a business enterprise is linked to the sector in which it operates. In case of banks, ROA is the commonly used indicator of profitability and it is defined as the ratio of profit after taxes to the total of average assets of a bank. It measures how effectively a bank's management is able to generate revenue from its assets. A much simpler and more widely adopted approach is to use ROA as a profitability measure, which find support from studies, such as Rhoades et al. (1981) and Evanoff and Fortier (1988). Golin (2001) also considers ROA as a key ratio for measuring profitability of banks. Return on equity (ROE) could be used as an alternative measure of profitability of banks which measures the return to shareholders on their equity. Banks with a lower leverage or a higher equity may report a lower ROA but a higher ROE. However, higher ROE disregards the risk associated with higher leverage, therefore, in our analysis we have used ROA as a measure of profitability.

3.1 Independent Variables: Profitability determinants

Bank specific variables

Provision for Non Performing Assets to Total Assets. This is obtained from a bank's income statement and signifies credit quality; this variable acts as a proxy for credit riskiness. Banks, as per the standards set by RBI, set aside a specific amount to cushion themselves from any degeneration which may occur in their profits due to credit risks. Since, a higher exposure to credit risk is expected to decrease profitability, a negative relationship between the two is hypothesised.

Capital to Assets Ratio: This factor is the ratio of total capital to total assets and the resultant effect of this variable on bank profits has been found both positive and negative in previous studies. Although an important determinant of profitability, its impact on profits of financial institutions is ambiguous. Inadequate capital indicates a risky position, so we might expect a negative association (Berger 1995) but, in context to the conventional risk return hypothesis, lower capital and a risky position can generate higher profits. In one of the views, higher equity can cause a decline in the cost of capital which signals a positive effect (Molyneux 1993). However, a strong capital structure for any institution in a

developing economy acts like a buffer to withstand any adverse situation during crisis. Given the above facts the anticipated effect of this variable is ambiguous, therefore, the impact of bank capitalisation cannot be anticipated theoretically.

Annual Growth of Deposits: As a measure of bank's growth, we include total deposits and their annual growth as one of the independent variables. As understood, a bank with faster growth in deposits can expand its business quickly and reap higher profits. But this increase in profits due to higher deposit growth depends upon a number of other factors as well. Primarily, it depends upon the ability of bank to convert its deposits into income generating assets which reflects its operational efficiency. Higher growth is generally associated with higher profitability. However, higher growth may also attract more competition from other players which, in turn, reduces the profits. Thus, the impact of this variable cannot be anticipated in theory.

Bank Size : To account for bank size we use total assets of banks. A very debatable topic in literature is which bank size optimizes bank profits. To this end, we build a dummy for large and small banks based on their total assets. Larger banks attribute to economies of scale and greater diversification, which reduces risk and increases profits. One side of the studies indicates a positive relationship between the two (Smirlock 1985). However, an increased bank size may also have an opposite effect of decreasing bank profits as expenses, which include overheads and bureaucratic process costs, are also incurred in managing such large firms. (Stiroh and Rumble 2006; Pasiouras and Kosmidou 2007)

Non-Interest Income: Banks have moved away from their traditional activities towards offering more diversified services as they face more competition within the banking sector as well from non banking companies and the capital markets. As a consequence, the sources of income generation have shifted from fund based activities to more fee and fund based activities. Studies have shown that more diversification can yield better profits (Jiang et Al, 2001). However, fee based income can actually exert a negative impact on profitability since non interest income, such as trade in derivatives, etc., are subject to more intense competition than the traditional income activities (Gisher and Jutner,2001). Nevertheless, a higher revenue stemming from non traditional activities increases the share of non interest income, thereby increasing profitability. So we expect this variable to enter the regression model with a positive sign.

Operating Expenses to Total Assets: This includes the expenditure made towards general operations of a bank, the salary paid, the staff expenses and the property costs. Higher operating costs may have a negative impact on profitability. However, it has also been argued that higher operating costs to total

assets account for operational efficiency and many efficient banks may effectively manage these expenses to generate higher profits.

3.2 Industry Specific Variables

A whole new trend of studies relating to market power and financial profits started with the emergence of Structure Conduct Hypothesis (SCH) which states that an increased market concentration will yield monopoly profits. We measure the market concentration in terms of the Herfindahl-Hirschman Index (HHI),² calculated as the sum of square of market shares of each banks where market share is expressed as fractions. Banks in a highly competitive industry set up and earn monopoly profits due to collusive behaviour (Gilbert 1984). This collusive behaviour involves price setting by larger firms. In case of the banking industry, this collusion could be in the form of higher rates to for loans and lower rates given to customers on deposits. Thus, a higher concentration may lead to a positive impact on profitability. Arguments also point out that this increase in profits is not due to collusive behaviour but due to exploitation of economies of scale, and efficiencies achieved by larger banks. Conversely a higher concentration may also mean tougher competition which may affect profits negatively. Opponents of the SCP hypothesis argue that higher profits may not always be due to collusion by the banks but also due efficiencies of scale. Hence, this effect of market power on profits needs to be determined empirically.

3.4 Macroeconomic variables:

GDP growth: It is expected that the financial sector profitability will increase during cyclical upswings, owing to the fact that lending will increase during times of economic growth. This indicates a positive relationship between GDP growth and profitability

Inflation rate: As mentioned above in the literature, the relationship between inflation and profitability is substantial. This variable is included to account for economic uncertainty. Through this paper, we explore the impact of inflation rate on the profitability of the financial sector .Therefore, the expected effect of this variable is ambiguous.

Table 1 below gives the description of the various factors used in the study and their expected effect as explained above.

Table 1: Description of the factors used in the study

| Dependent Variable | Description of Dependent Variable | |
|-----------------------------------|--|------------------------|
| Profit Variable | | |
| Return on assets | Profit after tax to the total assets | |
| Independent Variables | Description of Independent Variable | Expected Effect |
| Loan loss provisions(Credit Risk) | Loan loss provisions to total loans | Negative |
| Capital variable | Capital to total assets | Positive |
| Non- interest income | Non- interest income to total assets | Positive |
| Deposit growth | Annual deposit growth (%) | Negative/Positive |
| Bank size | Accounting value of total assets, used a Dummy variable for different bank sizes | Negative/Positive |
| Operational efficiency | Operating expenses to total assets | Negative/Positive |
| GDP | The yearly real GDP-growth | Positive |
| Inflation | Rate of inflation(WPI) | Negative/Positive |
| Herfindahl -Hirschman Index | Market shares of all banks expressed as fractions | Negative/Positive |

4. Econometric Specification

Berger et Al. (2000) specifies that bank profits tend to persist over time reflecting impediments to market competition, informational opacity and/or sensitivity to regional/macroeconomic shocks to the extent that they are serially correlated. Therefore, we use the following dynamic specification to empirically test the effect of internal and external determinants on profitability of Indian banks:

$$ROA_{it} = c + \delta ROA_{i,t-1} + \sum_{j=1}^J \beta_j X_{it}^j + \sum_{k=1}^K \beta_k Y_{it}^k + \sum_{l=1}^L \beta_l Z_{it}^l + \varepsilon_{it}$$

² HHI is calculated as the square of market shares of all banks where market share is expressed as fractions of total assets of each bank over total assets of all banks.

where $\varepsilon_{it} = v_i + u_{it}$...Equation 1

ROA_{it} denotes the profitability of bank i at time t with $i=1, \dots, N$ and $t=1, \dots, T$. c is the constant term. X_{it}^j , Y_{it}^k and Z_{it}^l are explanatory variables representing bank specific factors, industry specific factors and macroeconomic factors, respectively. ε_{it} is the disturbance term with unobserved bank specific effect v_i and u_{it} the idiosyncratic error where $v_i \sim IIN(0, \sigma_v^2)$ and $u_{it} \sim IIN(0, \sigma^2)$. Here, one period lag of profit variable $ROA_{i,t-1}$ as one of the independent variables makes the specification dynamic and its coefficient δ denotes the speed of adjustment. A value of δ between 0 and 1 indicates the persistence of profits. A δ value near 0 suggests that the industry is fairly competitive (high adjustment speed) and a δ value near 1 suggests that the industry is less competitive (slow adjustment speed).

In the static panel data model, estimation is done using fixed or random effects model. However, using a lagged dependent variable as one of the regressors would yield a model which is dynamic in nature. Consequently, least square estimation would produce biased and inconsistent results (Baltagi 2001). Arellano and Bond (1991) suggest that ‘consistency and efficiency gains can be achieved by using all available lagged values of the dependent variables as instruments plus the lagged values of all independent variables which are endogenous, as instruments.’ Another issue with the model is that the capital to total assets ratio variable may potentially suffer from endogeneity. Banks could increase their earnings by increasing their capital to assets ratio and its reverse causality can also be true. Therefore, capital to assets ratio should be modelled as an endogenous variable. Moreover, level of provisions to be kept aside for bad debts are decided and adjusted for at the beginning of each financial year by the banks. Therefore, provisions for loan losses to total loans ratio, which accounts for credit risk, is modelled as a predetermined variable in the above models

Following García-Herrero et al. (2009) and Athanasoglou et.al (2008) we address the abovementioned issues by using the generalized method of moments (GMM). This estimation accounts for endogeneity of factors and dynamic nature of the regression and by using lag of the dependent variable and lags of exogenous variables as instruments.

5. Data

We use bank level data for 42 Scheduled Indian Commercial banks as reported by RBI and CMIE over a period of 14 years from 2000 to 2013. This forms a balanced panel data set resulting in 588 bank year observations. The model estimation is done using ROA as dependent variable as specified in Equation 1

using data from 2000 to 2013 as a whole. We also estimate the same model separately for the crisis period from 2006 to 2009.

We make all explanatory variables stationary at the same level to estimate the dynamic model given in Equation 1 by using GMM estimation technique. The problems related to stability of coefficients, presence of autocorrelation in the errors, problem of over identifying restrictions and goodness of fit of the model have been duly addressed.

Table 2: Cross correlation matrix of the independent variables.

| INDEPENDENT VARIABLES | CA | LLP | NII | OP3 | DEP | HHI | INFLATION | GDP | DUMMY |
|--|---------|---------|---------|---------|---------|---------|-----------|---------|---------|
| CAPITAL TO TOTAL ASSETS(CA) | 1 | 0.1052 | 0.1196 | 0.1507 | -0.0671 | 0.1584 | -0.1686 | -0.1271 | -0.2633 |
| LOAN LOSS PROVISIONS TO TOTAL LOANS(LLP) | 0.1052 | 1 | 0.3282 | 0.0350 | -0.1955 | 0.0258 | -0.4070 | -0.0668 | -0.2326 |
| NON INTEREST INCOME TO TOTAL ASSETS(NII) | 0.1196 | 0.3282 | 1 | 0.0927 | -0.0713 | -0.0024 | -0.2138 | -0.0665 | -0.1638 |
| OPERATING EXPENSES/ TOTAL ASSETS(OPEXP) | 0.1507 | 0.0350 | 0.0927 | 1 | -0.0635 | -0.0042 | -0.0510 | -0.0338 | -0.2698 |
| DEPOSIT GROWTH(DEP) | -0.0671 | -0.1955 | -0.0713 | -0.0635 | 1 | -0.0166 | 0.0759 | 0.0352 | 0.0687 |
| HHI | 0.1584 | 0.0258 | -0.0024 | -0.0042 | -0.0166 | 1 | -0.2129 | -0.4791 | -0.1827 |
| INFLATION | -0.1686 | -0.4070 | -0.2138 | -0.0510 | 0.0759 | -0.2129 | 1 | 0.1704 | 0.3867 |
| GDP | -0.1271 | -0.0668 | -0.0665 | -0.0338 | 0.0352 | -0.4791 | 0.1704 | 1 | 0.1304 |
| DUMMY(SIZE) | -0.2633 | -0.2326 | -0.1638 | -0.2698 | 0.0687 | -0.1827 | 0.3867 | 0.1304 | 1 |

Table 2 above shows results of cross correlation analysis among the independent variables. It can be understood that the variables do not possess multicollinearity problem.

Table 3: Descriptive Statistics

| | ROA | CAPITAL TO TOTAL ASSETS | LOAN LOSS PROVISIONS TO LOANS | NON INTEREST INCOME | OPERATING EXPENSES TO TOTAL ASSETS | DEPOSITS GROWTH | GDP | INFLATION | HHI |
|-----------|-------|-------------------------|-------------------------------|---------------------|------------------------------------|-----------------|---------|-----------|---------|
| Mean | 0.937 | 0.1035 | 0.0109 | 0.5388 | 0.0309 | 15.521 | 7.13915 | 6.9914 | 632.334 |
| Median | 0.955 | 0.0493 | 0.0088 | 0.4512 | 0.0181 | 14.658 | 7.51 | 6.03 | 602.162 |
| Maximum | 4.25 | 1.4505 | 0.04723 | 1.9134 | 0.5325 | 100 | 9.57 | 14.97 | 784.408 |
| Minimum | -3.38 | 0 | -0.0362 | 0.0861 | 0.0001 | -30.729 | 3.88 | 3.2 | 532.781 |
| Std. Dev. | 0.564 | 0.0178 | 0.0083 | 0.3226 | 0.0494 | 10.3100 | 1.9534 | 3.3294 | 82.3593 |

Descriptive statistics of the variables in the study reveals some interesting insights.

The mean for return on assets is recorded at 0.93% over the entire sample period. The large gap between the minimum and maximum values of credit risk (loan loss provisions to total loans ratio) suggests that some banks suffer from a huge burden of bad loans, whereas a few banks have managed their bad debts quite well. The mean for capital to asset ratio is 10% suggesting Indian banks are well capitalised. The difference between maximum and minimum for deposit growth suggests the heterogeneity among bank deposit growth in banks.

6. Empirical Results

To select Fixed or Random Effects model, we estimate the equation (1) using random effects and then check for the presence of fixed effects using Hausman Test. However, as mentioned earlier, least square estimation with fixed effects in the presence of lagged dependent variable as a regressor will produce biased and inconsistent results. Therefore, we use GMM to account for the problems in the estimation and consistency of results. We report the results of Hansen J Statistics and Wald test for testing over identifying restrictions in the model and to test the goodness of fit, respectively.

Lagged dependent variable of the profitability measure ROA comes out to be highly significant across both the time periods in the study. Therefore, it confirms to the dynamic nature of the model specification and it justifies the use of a dynamic model. The coefficient of lagged dependent profit variable δ takes a value of 0.337, indicating a moderate degree of persistence of profits. This shows that the product markets of Indian Banks are moderately competitive and less opaque due to asymmetry in information. The Indian banking sector is presently moderately competitive and it is not far away from becoming a perfectly competitive industry in future.

Table 4: Estimation Results-GMM Panel data Estimation

| Bank Specific ,Industry specific ,Macroeconomic Variables | | | Only Bank specific variables | |
|---|--------------|----------|------------------------------|-------------|
| Variables | Coefficient | p- value | Coefficient | p- value |
| ROA(-1) | 0.337455 | 0.0000 | 0.335134 | 0.0000 |
| Capital/Assets | 9.169231 | 0.0000 | 10.44716 | 0.0000 |
| Loan Loss Provisions/total loans | -9.82483 | 0.0000 | -4.596639 | 0.0000 |
| Non Interest Income/Total assets | 14.16065 | 0.0000 | 12.1108 | 0.0000 |
| Operating expenses/total assets | 2.564402 | 0.0001 | 2.616414 | 0.0000 |
| Deposit growth | 0.016087 | 0.0000 | 0.017776 | 0.0000 |
| H-HI | 0.000996 | 0.0000 | | |
| Inflation(rate) | -0.020443 | 0.0000 | | |
| GDP | 0.026037 | 0.0000 | | |
| Dummy(size) | 0.224304 | 0.0000 | | |
| J-statistic | 38.81461 | | J-statistic | 41.11869 |
| Prob(J-statistic) | 0.189433 | | Prob(J-statistic) | 0.256364 |
| Test order | | | Test order | |
| AR(1) | 0.0086 | | AR(1) | 0.004 |
| AR(2) | 0.1232 | | AR(2) | 0.109 |
| Wald test | | | Wald test | |
| Chi-square(df) | 3170.236(10) | | Chi-square(df) | 10679.43(6) |

J –Statistic-The test for over-identifying restrictions in a Generalised Method of Moments dynamic model estimations

AR(1) Arellano-Bond test that average autocovariance in residuals of order 1 is 0 (H_0 : no autocorrelation).

AR(2) Arellano-Bond test that average autocovariance in residuals of order 2 is 0 (H_0 : no autocorrelation).

To check for the stability of our coefficients, we run the model regression twice, once with bank specific, industry specific and macroeconomic variables and again with only bank specific variables. Our results indicate towards stable coefficients of the variables under study. Hansen J test shows a case of no over identifying restrictions and it suggests that the model seems to be valid in the present context.

The AR(1) term is found to be significant with p value 0.008, whereas AR(2) term is found to be insignificant with p value 0.1232. This implies the presence of negative first order autocorrelation, but this does not imply inconsistency in the results. Inconsistency will imply if second order autocorrelation is present. Arellano and Bond (1990). Wald test gives chi-square value 3170.236 with 10 degrees of freedom rejecting the null hypothesis that all regression coefficients are equal to 0 indicating that the model has predictive power.

Table 5: Estimation Results during Crisis period-GMM Panel data estimation

| Bank specific, industry specific and macroeconomic factors during crisis | | |
|---|--------------------|----------------|
| Variable | Coefficient | p-value |
| ROA(-1) | 0.213495 | 0.0000 |
| Capital/Assets | 15.63241 | 0.0214 |
| Loan Loss Provisions/Total loans | -46.38148 | 0.0000 |
| Non Interest Income/Total assets | 14.81183 | 0.00205 |
| Operating expenses/Total assets | 0.340631 | 0.5477 |
| Dummy(size) | 0.213083 | 0.1997 |
| Deposit growth | 0.009717 | 0.0359 |
| GDP | 0.071418 | 0.0000 |
| Inflation(rate) | -0.010322 | 0.1448 |
| H-HI | 0.00081 | 0.2795 |
| Prob(J-statistic) | 0.547122 | |
| Test order | Prob. (p -value) | |
| AR(1) | 0.0039 | |
| AR(2) | 0.3996 | |
| Wald test(chi-sq) | Chi-square | 694.0575(10) |

Note: J –Statistic-The test for over-identifying restrictions in GMM dynamic model estimation.

AR(1)Arellano-Bond test that average autocovariance in residuals of order 1 is 0 (H_0 : no autocorrelation).

AR(2) Arellano-Bond test that average autocovariance in residuals of order 2 is 0 (H_0 : no autocorrelation).

We run the model across different time periods to assess the changes in the determinants, especially during the crisis period as it would be of interest to see the impact of financial variables on profitability during the crisis period.

Coefficient of Capital to assets ratio has been found to be positive and significant throughout all the time periods, indicating a sound financial position of the Indian banks. A well capitalised bank is able to grab more business opportunities and is also able to meet any unexpected loss which may arise in future, thus achieving greater profitability. The level of capitalisation can affect bank profitability in various ways: a) higher capital might increase the share of total advances which increases bank profits, b) higher capital implies better creditworthiness, and c) well capitalised banks will borrow lesser in comparison to their counterparts, which will reduce their funding costs. It can also be pointed out that

when banks hold excess capital in accordance with the statutory requirement, they can invest this capital in various securities and portfolios of risky assets, thus earning higher profits.

The effect of credit risk, measured by ratio of provisions for loans losses to total loans, is statistically significant and negative across all time periods. These sub standard assets increase the provisioning costs thereby reducing profitability. In the last decade various banks have adopted measures to improve the quality of their assets. Lending to sensitive sectors is of primary importance to banks as per RBI requirements; however, while granting credit, banks need to keep in mind credit quality or the quality of assets which may drain out their profits in future.

Operating expenses to total assets ratio have also been found to be significant which implies efficient cost management has been taken care of by the banks. We may link this positive impact to higher spending by banks on hiring efficient managerial personnel which results in banks becoming profitable. Efficient cost management is a precondition for higher profitability and the positive impact of these expenses on profitability shows a mature level of cost management done by the Indian banks. This indicates a positive relationship between better quality management and profitability. It may be suggested that banks in India have reached a maturity level where higher spending may be linked to generation of higher profits.

Deposit growth, another variable for banks efficiency, has been found to affect profitability significantly. This shows that banks have been able to convert its liabilities in the form of deposits into assets which generate income. However, in the crisis period, this impact was lesser as there were lesser opportunities for banks during that time. Also, banks had adopted a more conservative attitude during the crisis period and did not freely invest in assets to generate income. It suggests that banks with higher share of deposits may earn higher returns on their investments.

With respect to the dummy variable for size of the bank, we observe a positive impact of size on ROA which indicates that larger banks have a higher return on assets than banks which are smaller in size. It implies that larger banks operate at a more efficient scale than smaller banks. Thus, they exploit all economies of scale to reap higher benefits. This suggests the positive effect of size on bank profitability. Our analysis shows that banks which have a higher share of non interest income as a fraction of their total assets are more profitable. Banks have now moved away from their traditional business activities and are more diversified .This leads to a higher share of non interest income as a part of their total income. This includes fee based income as well as income generated from financial services. It has been

found that non-interest income has a significant impact on profitability during the entire period of study, however, during the crisis period this effect becomes insignificant.

The variable HHI is positive and highly significant suggesting a positive and significant effect of market concentration on bank profits, which supports the Structure Conduct Performance (SCP) hypothesis indicating that market concentration is positively, affects bank profitability. However, a positive impact of market concentration and profitability of banks does not always point towards collusive behaviour among banks in the market. It may not be the case with Indian Banking Industry with a rigid regulatory framework. The positive significance of HHI variable also suggests that banks by exploiting efficiency of scale, and providing products and services at a lower cost with updated technology in a concentrated market may generate higher profitability. This means higher bank profits in highly concentrated industry could be achieved by increasing their productive efficiency.

The study finds that GDP growth impacts bank profits positively and significantly. With growth in GDP, the demand for credit increases during cyclical upswings which leads to higher bank profits. During boom period, banks in general expand lending and charge higher interest rate on loans as well as generate higher fee income through increased transactions in the stock market. Also, banks generate less bad assets (NPAs) and ultimately earn higher returns.

The study finds the effect of inflation to be negative, which can be attributed to the fact that banks have been unable to anticipate expected rise in inflation and, thus, have incurred higher costs leading to a decline in profitability.

7. Conclusion.

Ever since the financial reforms of the early 1990's, the Indian banking Industry has observed an unprecedented changes in its structure. Most of these changes have notably occurred in terms of capital adequacy, market concentration, and non performing assets .The study assess the impact of bank specific, industry specific and macroeconomic determinants on bank profitability in a dynamic model framework, and provides useful insights into factors that determine the profitability of banks and their relevance. The study also assesses the resilience of the banking system during the financial crisis period. It applies GMM technique developed by Arellano and Bond(1991), an appropriate technique for dynamic panel data estimation which accounts for the problem of endogeneity of factors by specifying dynamic econometric model, to study the persistence of bank profits.

The lag of profit variable ROA has been found to be significant across all the time periods indicating its persistence. Persistence in bank profits is defined as the tendency for an individual bank to retain the same place in the banking industry profit performance distribution. The level of bank profit persistence determines the degree of competitiveness of product market, informational asymmetry. This shows that the product markets of Indian Banks are moderately competitive and less opaque due to asymmetry in information. Finally, the Indian Banking sector is not far away from becoming a perfectly competitive industry.

Bank specific variables, i.e., capital to assets ratio, operating efficiency, deposit growth and ratio of non interest income to total assets, are found to be significantly positively related to bank profits, whereas credit risk has been found significantly negatively affecting bank profits. Large banks have been found more profitable than the small banks. We also find evidence in support of the Structure Conduct Hypothesis (market power). Herfindahl-Hirschman Index indicates that banks in the Indian Banking Industry respond positively to market concentration. Even though the number of market players within the industry is increasing but they have structures with greater productive efficiency and are able to exploit the updated technologies which increase their efficiency. Profit variable ROA also responds positively to GDP growth, indicating profits are pro-cyclical and banks earn higher profits during boom periods. However, the effect of inflation has been found to be negative. During the crisis period, no major change in the level of persistence of bank profits is seen. The effect of size of the bank and operational efficiency on profitability have been found insignificant. However, the variable for credit risk has been found to be highly significant suggesting that banks with higher credit riskiness have been less profitable during the crisis period.

The following policy implications may be suggested:

- 1) There exists a moderate to high degree of competition within the Indian banking industry and banks need to offer more diversified products and services and gain competitive advantage to remain at a particular profit level within the industry.
- 2) Capital, in the case of banks, acts as a buffer to withstand any financial shocks in the economy and contributes towards an increase in profits.
- 3) Banks need to address the issue of non-performing assets with utmost priority as these non performing assets considerably drain out the profits of banks.
- 4) Banks in India have been moving towards operational efficiency, thus, banks can afford to spend upon human capital which may help them to achieve higher profitability through their managerial expertise.
- 5) Banks need to focus on attracting greater amount of deposits which will further be converted into income generating assets.

6) Being productively efficient, Indian banks can become more profitable even though the market concentration increases and the number of market players increase within the industry.

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