CHAPTER 3
RESEARCH OBJECTIVES AND METHODOLOGY

Preview

In this chapter, the research methodology, objectives, and hypotheses of the study, the sample size and data sources, are presented. In addition, this chapter provides specifics regarding the variables that were chosen and how those variables were operationalized. In addition to this, it covers the dependent variables, independent variables, and control variables that were selected for the analysis of the collected data. In addition to this, it includes specifics on the data description as well as checks of assumptions for the implementation of Panel Data Analysis to conduct the analysis for this particular study.

3.1 Introduction

This chapter provides the statement of the problem, objectives of the study, hypotheses, the definition of the variables, data selection, and the methodology to analyse the impact of gender diversity on profitability of Indian public and private banks. A number of variables are incorporated in the empirical study. Additionally covered in this chapter are details on the data gathered and used, the study's time frame, the databases selected, and additional information sources. As the chapter goes on, it describes the variables, discusses the panel data methodology, and provides a summary of the fundamental statistics related to the chosen data.

3.2 Statement of Problem as per research gaps

The majority of studies done on board composition have excluded the banks because the managerial structure, reporting, and disclosure practices of the banking companies in India differ from those of other non-banking and non-financial firms. As a result, there aren't many studies being done on the banking industry, particularly when it comes to the Indian banking industry. The management must focus on increasing bank productivity because, according to the literature, more productivity results in increased profitability (Parast and Fini, 2010; Narwal and Pathneja, 2015; Miller,

1984). Listed companies in India had to add at least one woman director to their board of directors in accordance with the requirements of the Companies Act 2013 and SEBI regulations. Due to the under representation and outright absence of women directors on the boards of Indian corporations, especially those operating in the banking industry, these restrictions were passed. A study on gender diversity on bank boards is therefore absolutely necessary. Therefore, the present study analyses the effect of gender diversity on profitability of public and private sector banks in India.

3.3 Objectives of the Study

The research objective is to study the impact of board's gender diversity on profitability of banks. In the light of main objective, the following specific objectives have been formulated:

1. To examine the impact of gender diversity of board members on Risk performance of banks.
2. To examine the impact of gender diversity of board members on the lending practices of banks.
3. To examine the impact of gender diversity of board members on market price performance.
4. To compare the relationship between the gender diversity of board members and profitability of public and private sector banks.

3.4 Research Data and Sample Selection

During the time period of 2013 to 2022, this research looked at 26 publicly traded Indian banks, of which 13 came from the public sector and 13 came from the private sector. To begin, we looked at all of India's banks to determine the sample size. Then we eliminated banks that were not publicly traded during the selected years, as well as those that did not have any financial information available. As a result, we arrived at our sample by taking into consideration the banks that gave the necessary information for our selected variables. We collected information on the governance of the bank as well as its financial characteristics from a variety of sources: governance variables (board size, bank size, bank age, female ratio in board members, priority sector lending, leverage, provision to non-performing loans, percentage of independent

directors, and productivity per employee ratio, NPL/TA) were extracted from the annual financial reports of the selected banks. The annual reports of the banks were downloaded from the official websites of the banks that were chosen for this research while financial variables (ROA, ROE, EPS, CAR, Market Cap) were obtained from the Capitaline database.

3.5 Research Variables under Study

The key measure to assess the impact of gender diversity on the profitability of Indian banks that is being captured in the current study relates to performance of Indian banks. This measure can broadly be segregated into risk performance, market price performance, lending practices and profitability of public and private banks. In order to capture the holistically performance of banks, these four broad-based measures are included in the study. The key dependent, independent, and control variables that have been considered in the current study are described as follows:

3.5.1 Dependent Variables

The present study deploys different measures of risk performance, financial, lending practices, and market price based performance as the key-dependent variables. The present study deploys three different dependent variables as proxies to risk performance. These measures include Tobin's Q (Tobin Q), Provision towards NPA and Capital Adequacy Ratio (CAR). Two dependent variables are deployed as proxies to lending practices. These measures include Non- performing Loan to Total Assets ratio (NPL/TA) and Priority sector lending (PSL). Similarly, two different measures of market price performance have been considered. These measures include Market Capitalization (Market Cap) and Earnings per Share (EPS). The present study deploys four different dependent variables as proxies to financial-based measures of profitability. These measures include Earnings per Share (EPS), Return on Assets (ROA), and Return on Equity (ROE), Productivity per Employee Ratio (PPER).

- **Tobin's Q (TobinQ)**

Tobin's Q is an important measure of risk performance. In the current study, the variable Tobin's Q has been defined as the ratio of market capitalisation and total

assets. This variable is deployed earlier by many studies **(Salinger, 1984; Singh et al., 2018)**.

- **Provision towards NPA**

NPA causes a decrease in assets that generate income while also forces banks to deduct a portion of their profits for NPA. The profitability of the bank is lowered by provisions for NPA. A higher provision is undesirable because it would undermine investor faith in the bank group. Therefore, increased provisions for NPAs indicate ineffective NPA management on the part of the bank **(Siraj and Pillai, 2013)**. This variable is deployed earlier by many studies **(Rai, 2012; Modi, 2018).**

- **Capital Adequacy Ratio (CAR)**

This ratio measures the adequacy of the firms in case of unexpected risk for creditors and depositors. Proper management of debt ratio and capital adequacy ratio helps in absorbing loss by establishing financial stability in the banks and promotes financial soundness **(Ezike and Oke, 2013; Fatima, 2014).** Higher capital adequacy ratio has a positive impact on the financial soundness of the bank **(Alemu, 2015; Bateni et al., 2014).**

- **Non- performing Loan to Total Assets Ratio (NPL/TA)**

With credit risk, there is a chance that a borrower would break his contractual obligation to make payments **(Richard et al., 2008)**. Non- performing loans to total assets ratio is considered to be the good indicator of asset quality of banks. This ratio measures the amount of assets under risk of default in relation to the total resources controlled by the bank **(Birhanie, 2020).** This variable is deployed earlier by many studies **(Ahmed et al. 1997).**

- **Priority sector lending (PSL)**

Priority sector lending aims to contribute the economic growth of the country **(Yadav and Sarma, 2021).**

- **Market capitalization (Market Cap)**

Market capitalization refers to an organization's overall value as measured by the sum of the market values of all of its outstanding shares. This measure is one of the most widely considered market based indicators of firm performance **(Narayan et al., 2011; Ewing and Thompson, 2016).**

- **Earnings per share (EPS)**

Understanding a company's overall earning potential as well as its earning potential per share is crucial. This statistic is calculated as a firm's profit after tax (PAT) divided by the total number of outstanding shares. This is a common measure that has previously been used by many studies **(Marquardt and Wiedman, 2005; Amyulianthy and Ritonga, 2016)**.

- **Productivity per Employee Ratio (PPER)**

Productivity per Employee Ratio is the ratio of Net Profit to total number of employees (**Bhatia et al. 2012).**

- **Return on Assets (ROA)**

Return on Assets (ROA) is the ratio of a bank's annual net income to its annual average total assets. The studies like **(Bristy et al., 2021; Ratnawati et al, 2020; Terraza, 2015)** have used ROA as substitute of financial profitability.

- **Return on Equity (ROE)**

Return on Equity (ROE) is also used as another proxy of bank's financial outcome as applied in other similar studies **(Kumar et al, 2020; Nigam and Gupta, 2018; Joeck et al., 2013).** ROE is the ratio of a bank's net income to the amount of equity held by shareholders.

3.5.2 Independent Variable

Gender diversity in board of banks is considered as Independent variable. Gender diversity will be measured in terms of percentage of women in the board room **(Abad et. al., 2017)**.

Gender Diversity = $\frac{\text{Number of Women Board Members}}{\text{Total number of Board Members}}$ *100

To avoid the homogeneity of board (The board comprises only Male or Female), Board diversity is confirmed by devising Blau Diversity Index (Blau, 1977)

Blau Diversity Index = $1 - \sum_{i=1}^{n} P_i^2$

Where P_i = Percentage of Women Board Members

The value of Blau Diversity Index ranges from 0 to 0.5. At 0.5 the board of any company has maximum gender diversity.

0 brings the homogeneity in the sample of banks; we have set 10% gender diversity in board room as critical threshold.

3.5.3 Control Variables

A thorough investigation of the existing literature and the study objectives guide the selection of the control variables. As control variables, board size, bank size, bank age, leverage and percentage of independent directors are considered in the study.

- **Board size**

The board size is based on how many people are selected to serve on it (men and women). This variable is deployed in many earlier studies **(Kumar et al., 2020; Jyothi and Mangalagiri, 2019; Berger et al., 2014).**

- **Bank size**

Bank size is determined by taking the natural log of the bank's market capitalization. This variable is deployed in many earlier studies **(Bristy et al., 2021; Saggar et al., 2022).**

- **Bank age**

The age of a bank is calculated by taking the natural log of the total number of years for the bank has been functioning. This variable is deployed in many earlier studies **(Palvia et al., 2014; Perryman et al., 2016).**

- **Leverage**

Because interest payments are tax deductible, debt in an organization's overall capital structure can add value **(Rajan and Zingales, 1995).** The present work utilizes total debt and total asset ratio as the measure of leverage. This measure of leverage has been widely utilized in applied works **(Anderson and Reeb, 2003; Vermoesen et al., 2013).**

- **Percentage of Independent Directors (Id)**

Percentage of independent directors is the ratio of independent directors to the total directors. This variable is deployed in many earlier studies **(Liu et al. 2014; Garcia and Emma, 2015).**

Table 3.1: Research Framework

Objective	Dependent Variable	Independent Variable	Control Variable
Risk performance of banks	1. TobinQ 2. Provision Towards NPA 3. Capital Adequacy Ratio	Blau Index	1. Bank Size 2. Bank Age 3. Board Size 4. Leverage 5. Percentage of Independent Directors
Lending practices of banks	1. NPL/TA 2. Priority Sector Lending		
Market Price performance	1. Market Cap 2. EPS		
Profitability of Banks	1. EPS 2. Productivity Per Employee 3. ROA 4. ROE		

Source: Author's compilation

3.6 Hypothesis as per objectives

3.6.1 Objective 1

To examine the impact of gender diversity of board members on Risk performance of banks

H_1: After controlling for the impact of other variables, board gender diversity has positive significant impact on Tobins'Q.

H_2: After controlling for the impact of other variables, board gender diversity has positive significant impact on Provision towards NPA.

H_3: After controlling for the impact of other variables, board gender diversity has positive significant impact on Capital Adequacy Ratio.

3.6.2 Objective 2

To examine the impact of gender diversity of board members on the lending practices of banks.

H_4: After controlling for the impact of other variables, board gender diversity has positive significant impact on NPL/TA

H_5: After controlling for the impact of other variables, board gender diversity has positive significant impact on Priority sector lending.

3.6.3 Objective 3

To examine the impact of gender diversity of board members on market price performance.

H_6: After controlling for the impact of other variables, board gender diversity has positive significant impact on Market capitalization.

H_7: After controlling for the impact of other variables, board gender diversity has positive significant impact on Earnings per share.

3.6.4 Objective 4

To compare the relationship between the gender diversity of board members and profitability of public and private sector banks.

H_8: After controlling for the impact of other variables, board gender diversity has positive significant impact on Earnings per share of private banks.

H_9: After controlling for the impact of other variables, board gender diversity has positive significant impact on Productivity per employee ratio of private banks.

H_{10}: After controlling for the impact of other variables, board gender diversity has positive significant impact on Return on assets of private banks.

H_{11}: After controlling for the impact of other variables, board gender diversity has positive significant impact on Return on equity of private banks.

H_{12}: After controlling for the impact of other variables, board gender diversity has positive significant impact on Earnings per share of public banks.

H_{13}: After controlling for the impact of other variables, board gender diversity has positive significant impact on Productivity per employee ratio of public banks.

H_{14}: After controlling for the impact of other variables, board gender diversity has positive significant impact on Return on assets of public banks.

H_{15}: After controlling for the impact of other variables, board gender diversity has positive significant impact on Return on equity of public banks.

3.7 Estimation Technique

3.7.1 Panel Data Analysis

In order to speed up the analysis of this study, STATA 12 statistical software was employed. This thesis uses the panel data analysis as its primary econometric method. Panel or longitudinal data are observations on a cross-section of houses, nations, firms, etc., collected over a number of time periods **(Arellano, 2003).** A panel therefore has two dimensions: one for cross-sectional units and the other for time series. These data sets offer extensive sources of economic data. The availability of panel data has significantly increased in recent years, and the appropriate analytical techniques have also become more sophisticated. **Baltagi (2008)** has listed the advantages of panel data models as: (i) individual heterogeneity is controlled; (ii) panel data provide data that is more informative; (iii) panel data provide more variability and efficiency; (iv) panel data provide more degree of freedom; (v) the dynamics of adjustment could be studied better; (vi) the effects could be better identified and measured that are not recognisable in pure cross-sections or pure time-series data; (vii) as compared to solely cross-sectional or time-series data, panel data models enable us to create and evaluate more complex behavioural models; (viii) panel data are typically collected on micro units, eliminating biases brought on by aggregation over individuals or companies. Panel data modelling calls for a complex stochastic specification. In order to get consistent parameter estimates for the panel data model, it is crucial that we select the right estimators. The Pooled model, the Random Effects (RE) model, and the Fixed Effects (FE) model are the three basic models that are used for the estimation of the regression equation in the panel data. It is necessary to take into account both the test results and the properties of the data when deciding which model to use. One sort of model with constant coefficients, indicating both intercepts and slopes, is the pooled regression model. Researchers can pool all the data for this model and run an OLS regression model without making any

assumptions about individual differences. The FE model assumes that the slope coefficient is constant across firms and allows the intercept to vary for each firm which takes into account the uniqueness of each firm or cross-section unit included in the sample. Only when it is critical to examine the impact of factors that change over time is the FE model used. FE model is used when it is critical to examine the impact of variables that change over time.

While using the FE model, it is anticipated that some aspect of the individual may bias or influence the predictor or outcome variables, and that this needs to be taken into account. The correlation between the entity's error term and the predictor factors is predicated on this reasoning. To evaluate the overall impact of the predictors on the result variable, the FE model takes these time-invariant properties out of the equation.

In the RE model, the individual effects are distributed at random across the cross-sectional units, and the regression model is provided with an intercept term that acts as an overall constant term in order to capture the individual effects. Since the error term in the RE model is assumed not to be correlated with the predictors, time-invariant variables can serve as explanatory variables.

The cross-sectional units in the RE model are randomly assigned to the individual effects, and the regression model is given an intercept term that serves as an overall constant term to represent the individual effects. Time-invariant variables can be used as explanatory variables because it is expected that the error term in the RE model is not connected with the predictors.

The RE model's predictor variables may or may not be influenced by the requirements for specific attributes. This raises the issue of omitted variable bias in the model because some variables could not be available. Beyond the sample utilised in the model, the RE model enables for generalising the inferences. Contrary to the FE model, the variation between entities is assumed in the RE model to be random and unrelated to the predictor or independent variables present in the model **(Greene, 2003)**.

By using a double subscript on its variables, the panel data analysis notation distinguishes this approach from time-series or cross-sectional analysis. The first sub-script indicates the cross-sectional unit, such as a company, a sector, a country, etc.,

while the second sub-script indicates the period. Regression's fundamental framework for a panel data regression is as follows:

$Y_{it} = X_{it}\beta + \varepsilon_{it}$

[i= 1… …N, and t= 1……T]

Where Y_{it} is the observation on the dependent variable for cross-section unit *i* at time *t*, and X is the vector of the explanatory variables for unit *i* at time *t*.

The majority of panel data applications, however, use a one-way error component model that only takes individual impacts into account when there is a disturbance:

$\varepsilon_{it} = \mu_i + \vartheta_{it}$

Whereμ_i stand for the invisible, individual specific influence and ϑ_{it} stands for the residual disturbance. The first component fluctuates across people but remains constant over time, and the two components are believed to be independent of one another.

3.7.2 Hausman Test for comparing Fixed and Random Effects

Under the null hypothesis that individual effects are uncorrelated with any model regressor, the Hausman specification test compares fixed versus random effect models (**Hausman, 1978**). This test statistic follows the chi-squared distribution with k degrees of freedom. Hausman test examines if "the random effects estimate is insignificantly different from the unbiased fixed effect estimate" (**Kennedy, 2008**). The random effect model is troublesome if the null hypothesis of no correlation is rejected since it means that individual effects $\mu_i$are significantly correlated with at least one of the model's regressors. As a result, you should use a fixed effect model rather than its random effect equivalent.

3.7.3 Correlation

To determine whether the independent variables used in the regression are highly correlated or not, correlation is used. A general rule of thumb is that multicollinearity may be indicated if there is a correlation of 0.7 or higher between two independent variables.

3.7.4 Variance Inflation Factor

A multiple regression equation's multicollinearity is examined using the Variance Inflation Factor (VIF). When the independent variables in the model exhibit a high level of correlation, multicollinearity is present. The VIF determines how much variance in a variable's coefficient there is as a result of multicollinearity. High degrees of multicollinearity in the model are believed to be represented by a VIF value greater than 10.

3.8 Statistical Software

Statistical software like Microsoft excel and STATA 12 have been used for the analysis.

3.9 Data Description

Descriptive Statistics

This sub-section reports the descriptive statistics for all the variables that have been considered in the current analysis**.** Table 3.2 shows the descriptive statistics for all variables of selected public and private banks that have been utilized for the entire time-frame. The table shows that the average profitability ratios lie around 33.99 per cent for ROA, 68.97 per cent for EPS, 123.22 for PPER and -218.4 per cent for ROE. The table also shows that the Tobin's Q of the Indian banks is around 25.14 for the sample period. Further analysis reveals that the average Provision towards NPA is quite high and similar observations found for Market cap, CAR, NPL/TA and PSL. Besides, it is also evident that the Indian banks are highly levered with debt accounting for around 85.78 per cent of the total capital structure. The table further shows that the variables selected display great variations in terms of the average, median, minimum and maximum values obtained.

Table 3.2: Descriptive Statistics for all banks

Variable	Observation	Mean	Std. Dev	Minimum	Maximum
Blau Index	208	0.1736	0.1146	0.00	0.444
Bank Size	208	16.6402	1.4373	13.96	21.22
Bank Age	208	78.7596	35.4666	11.00	128.00
Board Size	208	10.3415	2.29130	6.00	17.00
Leverage	208	0. 8578	0. 13799	0.65	1.24
Id	208	48.1676	21.53646	0.00	90.00
Tobin Q	208	0.2514	0.5195	0.001	4.995
Provision Towards NPA	208	13.0950	1.8305	6.601	18.252
Market cap	208	14.3138	1.61096	10.43	18.23
CAR	208	13.9875	3.04343	8.50	33.66
PSL	208	15.3034	.98074	13.21	18.06
NPL/TA	208	3.7311	3.28763	0.01	13.10
EPS	208	6.8975	24.79391	-83.01	72.83
PPER	208	1.2322	53.99774	-606.00	429.00
ROA	208	0.3399	1.12283	-5.39	2.36
ROE	208	-2.1840	27.85892	-207.99	26.28

Source: STATA Outcome

Table 3.3 shows the descriptive statistics for all variables of selected public banks that have been utilized for the entire time-frame. The table shows that the Tobin'Q of the Indian banks is around 29.66 for the sample period. The table also shows that the average profitability ratios lay around -11.23 per cent for ROA, -345.7 per cent for EPS, -315.08 for PPER and -1180.38 per cent for ROE. Further analysis reveals that the average Provision towards NPA is quite high and similar observations are found for Market cap, CAR, NPL/TA and PSL. Besides, it is also evident that the Indian banks are highly levered with debt accounting for around 92.86 per cent of the total capital structure. The table further shows that the variables selected display great variations in terms of the average, median, minimum and maximum values obtained.

Table 3.3: Descriptive Statistics for Public banks

Variable	Observation	Mean	Std. Dev	Minimum	Maximum
Blau Index	104	0.1405	0.12059	0.00	0.44
Bank Size	104	16.4607	1.71116	13.96	21.22
Bank Age	104	99.6346	17.93735	59.00	128.00
Board Size	104	10.1827	2.69399	6.00	17.00
Leverage	104	0.9286	0.11702	0.65	1.24
Id	104	38.0739	20.07761	0.00	72.73
Tobin Q	104	0.2966	0.70230	0.00	5.00
Provision Towards NPA	104	14.0454	1.64565	9.20	18.25
Market cap	104	13.9435	1.47692	10.43	17.60
CAR	104	12.4646	1.84343	9.04	18.54
PSL	104	15.3492	1.06577	13.21	18.06
NPL/TA	104	3.7311	3.28763	.01	13.10
EPS	104	-3.4572	22.60899	-83.01	35.49
PPER	104	-3.1508	74.20881	-606.00	429.00
ROA	104	-0.1123	0.68204	-3.01	0.68
ROE	104	-11.8038	33.68447	-207.99	13.92

Source: STATA Outcome

Table 3.4 shows the descriptive statistics for all variables of selected private banks that have been utilized for the entire time-frame. The table shows that the Tobin Q of the Indian banks is around 20.63 for the sample period. The table also shows that the average profitability ratios lay around 79.21 per cent for ROA, 172.52 per cent for EPS, 561.52 for PPER and 743.59 per cent for ROE. Further analysis reveals that the average Provision towards NPA is quite high and similar observations found for Market cap, CAR, NPL/TA and PSL. Besides, it is also evident that the Indian banks are highly levered with debt accounting for around 78.69 per cent of the total capital structure. The table further shows that the variables selected display great variations in terms of the average, median, minimum and maximum values obtained.

Table 3.4: Descriptive Statistics for Private Banks

Variable	Observation	Mean	Std. Dev	Minimum	Maximum
Blau Index	104	0.2067	0.09837	0.00	0.40
Bank Size	104	16.8199	1.07649	14.84	19.15
Bank Age	104	57.8846	36.41756	11.00	118.00
Board Size	104	10.5000	1.80075	7.00	15.00
Leverage	104	0.7869	0.12019	0.68	1.00
Id	104	58.2613	17.98017	0.00	90.00
Tobin Q	104	0.2063	0.21249	0.01	0.96
Provision Towards NPA	104	12.1448	1.48418	6.60	14.90
Market cap	104	14.6842	1.66049	11.39	18.23
CAR	104	15.5105	3.24546	8.50	33.66
PSL	104	15.2576	0.89047	13.63	17.48
NPL/TA	104	2.4088	2.47051	0.12	16.69
EPS	104	17.2521	22.53349	-31.31	72.83
PPER	104	5.6152	17.72225	-88.00	28.00
ROA	104	0.7921	1.28670	-5.39	2.36
ROE	104	7.4359	15.43535	-81.80	26.28

Source: STATA Outcome

Table 3.5: Variance Inflation Factor (VIF) Statistics

Variables	Variance	1/Variance
Blau Index	1.74	0.5752
Bank Size	1.47	0.6783
Board Size	1.33	0.7506
Bank Age	1.25	0.7984
Id	1.23	0.8112
Leverage	1.08	0.9268

Source: STATA Outcome

Table 3.5 shows that multicollinearity is not present in the model.

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