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Critically Examining The Impact Of Covid-19 On The Productivity Of Indian Public And Private Sector Banks

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Abstract: Banks fuel the country's economic growth by enabling capital to move to productive assets at the appropriate time. Banking sector is the backbone of the Indian economy which provides significant insights to effectively generate money in real time for capital formation, credit creation, cash management, monetize debt, business growth, technological development, financial security & stability, and so on. Thus, banks have long been the engine in the development of industry and trade for India's success. Therefore, it is very important to assess bank's performance through productivity indicators to know about soundness of economy. Profitability, efficiency and productivity of banking sector make positive contributions to the financial system.

The purpose of this paper is to compare and examines the impact of Covid-19 on the Productivity of public and private sector banks in India. Sample of the study is based on the random sampling to select Public Sector Banks such as SBI & BOB and Private Sector Banks such as HDFC and ICICI. The study covers 6 years time period, before occurrence of Covid-19 from 2016-2019 and during Covid-19 from 2019-2022.

The present study will be defining productivity with reference to the efficiency and effectiveness. The study analyzed bank's productivity using key indicators mainly Loans to Deposits, Cost of Capital, Return on Investment, Leverage & Efficiency Ratio and Non-Performing Assets Ratio to do comprehensive and critical analysis of bank's productivity pre and during Covid-19.

The study will propose models which can be applied in areas such as Bank Performance Evaluation, Monetary & Non-Monetary Resources Management, and Continuous Improvement & Performance Management etc.

Keywords: Bank's Efficiency & Productivity, Comprehensive Productivity, Efficiency Measures, Indian Banking at Glance, Pre & During Covid-19.

1. Introduction

A sound and well managed Banking Sector is very essential for the growth and development of any country's economy. Generally Banks are the most dominant entity in the financial Industry. Banks support customers in mobilizing their savings to manage country's payment system. Banks facilitate the flow of capital to enterprises & act as the backbone of modern business. The development of any country mainly depends upon the banking system. Banks facilitate production, exchange & distribution of wealth for the economic growth and development. Banks are the custodians & distributor of fund and key determinants to increase banking productivity.

The corona virus was first found in Wuhan City, China and after that it spread very faster in rest of the world. The occurrence of Covid-19 pandemic has critically upset each and every aspects of economy including Banking Sector. It has created unpredicted situation in economy. Banking sector around the world faced immense pressure due to the occurrence of Covid-19 pandemic. COVID-19 has incurred disastrous consequences for India. (Gereffi, 2020, p.287-301, Mishra, 2020, p.100-137, RBI, 2020, Zang & et al 2020, Zang & et al, 2021, p.1-27) Currently, the number of people affected by the corona virus pandemic worldwide is more than 455 million. (WHO, Covid-19 Dashboard) The world experienced an economic shock due to lockdowns, border closures, travel bans and a variety of new obstacles faced by various economic activities. (Koutoupis & et al. 2021, p. 969–982) During pandemic time there were wide spread unemployment and sources of Income are gradually declined. Due to that customer's withdrawals of deposits increases and due to that profitability declined in Banks and leads to pathetic credit condition.

Due to pandemic situation customers were induced to adopt digital banking services and diverted to online or remote Banking. (Sharma & et al, 2021, p. 108-111) Due to that banks faced operational challenges and other challenges related to IT infrastructure. (RBI Bulletin, 2020) Covid-19 changed behaviour of customers in a way like less branch visit and more depend on online channels. (Jagtiani & Lamieux, 2021) Covid-19 increased risk of loan defaults and incur challenges for credit risk management. (Banerjee & Gopalan, 2020) Banks faced trouble in loan payment and recovery because of lockdowns, mobility restrictions, and economic slowdown. (Mehta & Chugan, 2021, p. 78-86) Generally Banks and Financial system are probably absorb the shock occurred in economy due to Covid-19 by supplying needed fund. (Acharya & Steffen, 2020, p. 43-47, Borio, 2020)

Productivity is defined as the ratio of input and output. Productivity is also defined in terms of efficiency improvement and technical changes with which inputs are transformed into outputs. The larger values of the ratio are considered as the better performance of a firm. Productivity refers to contrast between quantity of goods or services produced and the quality of input engaged to produce goods and services. The purpose of contrast between quantity produced and quality of input utilized is recognized as ability of organization. So Productivity means ability to Produce. Bank Productivity is effectiveness of Banks to use its inputs to generate out puts like loans, deposits and varieties of financial services enhance Profitability. Productivity is termed as efficient use of resources to achieve the set targets. Some scholars define it as a ratio of output produced with the input used. [6] Productivity is a measure of economic performance that compares the effectiveness of productive efforts in the form of output with the amount of inputs. (Roghaniana & et. al. 2012, p. 550-556) Productivity = Efficiency + Effectiveness = Doing things right + Doing the right things. (Roghaniana & et. al. 2012, p. 550-556)

Productivity of Banks can be measured in Multi Dimensions, which include Capital Utilization, Employee Competence and Branch Performance. Capital Productivity refers to how efficiently Bank uses its capital to generate income and maximize returns for Shareholders. (Mishra & Das, 2020) Employee Competency refers to efficiently and skill of bank employees to attain goals. Branch Performance refers to evaluation of competency of particular Branch in terms of customer services, revenue generation etc. (Hason & Marton, 2020, 277-308)

The present study aims to investigate impact of Covid-19 on Productivity of Indian Public and Private sector banks. The study examines differences in Bank productivity performance before and during covid-19. In present study productivity is measured using Comprehensive Productivity parameters. Loans to Deposits Ratio, Return on Investment Ratio, Efficiency Ratios, Non Performing Assets, Weighted Average Cost of Capital (WACC) and Financial Leverage are used to measure Comprehensive Productivity.

2. Literature Review

Existing literatures related to Productivity of banks and its impact on covid-19 pandemic were reviewed and some important point being extracted and highlighted here.

Qadri, S., U., Zhiqiang Ma & et al. (2023) evaluated financial performance before and after covid-19 of South Asian banking industry. The researcher has taken 34 banks as sample from South Asian region for the period of 5 years from 2016 to 2021 and applied Wilcox rank test. The researcher concluded that financial performance of South Asian Banking Industry adversely affected by covid-19 pandemic but impact of advance technology is very positive on financial performance of banks.

Gazi, M., A., I., Md. Nahiduzzaman & et. al. (2022) assessed effect of Covid-19 on financial performance and profitability of private commercial banks of Bangladesh. Researcher has taken 2010-2019 as pre pandemic period and 2010-2021 as pandemic period. Researcher has used various CAMEL parameters to assess financial performance, descriptive statistics and F-test, Housman test and panel data unit root test. Researcher concluded that the banks which performed well in pre pandemic duration, also performed well during pandemic period. The main reasons behind downfall in profitability of Banks were due to huge amount of nonperforming loans, maintaining high liquid assets and improper bank size.

Iqbal, Z., & Tanti, G., (2022) estimated financial performance of HDFC Bank pre and post covid-19 for the period of 5 years from 2017-2021. Researcher has used ratio analysis, camel model and T- test for analysis and interpretation of data. The Study explored that as per evaluation, overall financial position of bank is batter during study period. Therefore researcher concluded that HDFC bank will be able to fight with challenges of pandemic situation.

Sang, N., M., (2022), studied impact of Covid-19 on efficiency of 26 commercial Banks of Vietnam for the year 2019 and 2020 considering pre and during pandemic duration. Researcher has used input variables like customer deposits, personnel expenses, interest expenses and non interest expenses and output variables are total loans, interest income and noninterest income. Researcher has applied non parametric frontier analysis and data envelopment analysis (DEA) approach, to measure the efficiency of Vietnamese commercial banks. Researcher concluded that operational efficiency of 26 commercial Banks has improved during pandemic duration as compare to pre pandemic duration.

Pramitasari, T., D., & Subaida, I., (2020), analysed and compared pre and post covid-19 financial performance of four state owned banks in Indonesia. The performance indicators used by the researcher to measure financial performance of sample banks are return on assets, operating expenses to operating income, net interest margin, non performing loans, capital adequacy ratio and loans to deposits ratio. Researcher found that except net interest margin and non performing loans there is significant difference in the values of return on assets, operating expenses to operating income, capital adequacy ratio and loans to deposits ratio.

Kunt, A., D., & et. al (2021), inspected impact of Covid-19 pandemic on banks stock prices globally due to control actions taken by Government. Researcher found that globally banks have to face adverse impact of Covid-19 for a longer duration. Large and public sector banks faced enormous decline in stock price and stock return because their responsible role during crisis time. Further, banks having liquidity problems before crisis were suffered a lot during crisis time. Overall impact of Covid-19 on banks globally is different due to different circumstances.

Hu, S., & Zhang, Y. (2021), studied impact of Covid-19 on performance of corporate sector worldwide. Researcher revealed that covid-19 pandemic declined over all performance of corporate sector around the world. The countries having sound financial system, good governance and vigorous health care system to be able to fight with challenges occurred due to crisis and performed batter during Covid-19 duration.

Kumar, V., & Kumar, S., (2021), explained that Covid-19 pandemic adversely affected each and every sectors of an economy including Banking Sector. Banking sector is Backbone of Indian Economy. Researcher has analysed various strategic actions taken by Reserve Bank of India and Indian Government to recover economy from pandemic situation.

Yadav, S., & Jain, M., (2022), explored impact of Covid-19 on productivity and contentment of Bank Employees. Researcher has randomly taken sample of 105 bank employees and analysed employee productivity using different statistical tools, correlation, regression and test and Hypothesis testing. Researcher concluded that Covid-19 pandemic negatively affected employees work efficiency.

Rizwan, M., S. & et. al (2020), Studied covid-19 impact in 8 largely affected countries which include Canada, China, France, Germany, Italy, Spain, UK, USA. Researcher also found that there is significant increase in Systematic risk in selected countries during covid-19 duration. The study also assessed Banking policy responses of selected countries during pandemic time.

3. Research Methodology

"Research Methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically." (Kothari, 2004, p.8)

3.1 Problem of the Research study

A well managed banking system is very essential for the growth and development of any Country's Economy. Indian Banking Sector is confronted with varieties of challenges which include increased burden of Non-Performing Assets, Liquidity Problems, Slow Economic Growth, Regulatory & Compliances, Competition among Banks and need of Innovative Technology. Occurrence of Covid-19 pandemic incurs more uncertainties and challenges for Indian Banking Sector. Banks must focus to ensure productivity, profitability, maintain liquidity and cost reduction in favour to survive in challenging situation. Therefore, the main aim of present research is to measure impact of Covid-19 pandemic on Productivity of Indian Public and Private Sector Banks Pre and During Covid-19.

3.2 Objectives of the study

The Study is based on following Objectives.

1. To Measure Comprehensive Productivity of Selected Indian Public and Private Sector Banks Pre and During Covid-19 duration.
2. To compare Productivity of selected Indian Public and Private Sector Banks Pre and During Covid-19 duration.

3.3 Research Gap

Present study will fill the gap in literature by concentrating on the impact of Covid-19 on productivity of Indian public sector and private sector banks.

- Many researchers conducted research to study bank's productivity pre and post covid-19 but very few researches conducted on pre and during covid-19.
- Previous researches have only ratio analysis but in present study researcher has applied statistical tools for reliable results.
- Most of the existing literatures are based on only conceptual analysis of impact of Covid-19 on Banking but in present study researcher has given conceptual as well as analytical interpretation of productivity of banks pre and during covid-19.

- Majority researcher analysed limited area of productivity i.e. Employee and Branch Productivity. But in present research, researcher has broadly discussed and analysed comprehensive productivity to give in-depth clarity of Bank Productivity.
- Previous literatures were related to Covid-19 impacts based on one year or two years or quarters of covid-19 duration. But in present study researcher has taken 3 years before occurrence of covid-19 and 3 years during covid-19 to ensure authenticity in the research findings.

3.4 Period of the Study

The study covers 6 years' time period, before occurrence of Covid-19 from 2016-2019 and during Covid-19 from 2019-2022. Time duration before occurrence of covid-19 provides a baseline to Compare Productivity of sample Banks during Covid-19 Duration.

3.5 Research Design

The present Study is based on Descriptive Research Design. Basically Descriptive researches focuses on explaining the features of particular individuals, groups or situations. (Kothari, 2004)

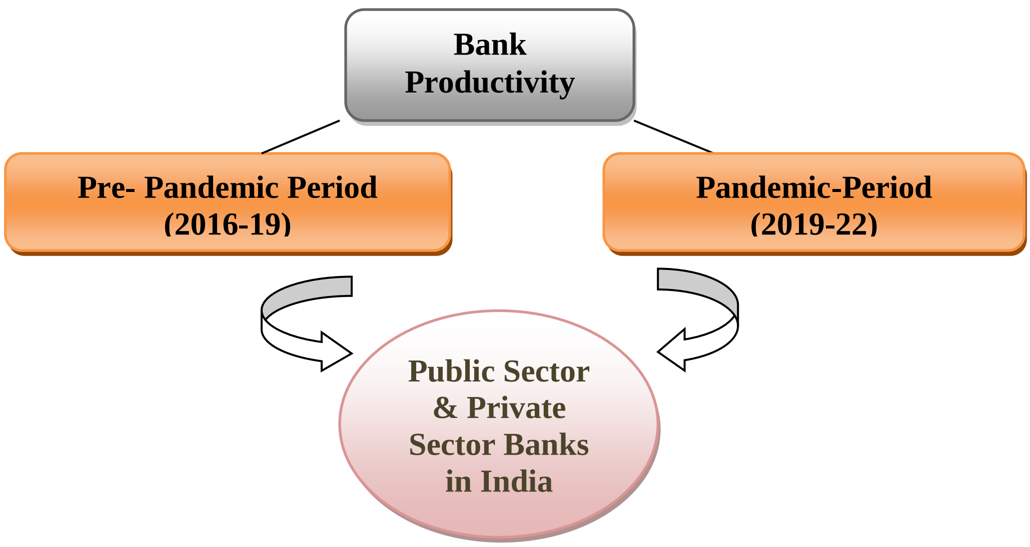
3.6 Sampling Design and Sample Size

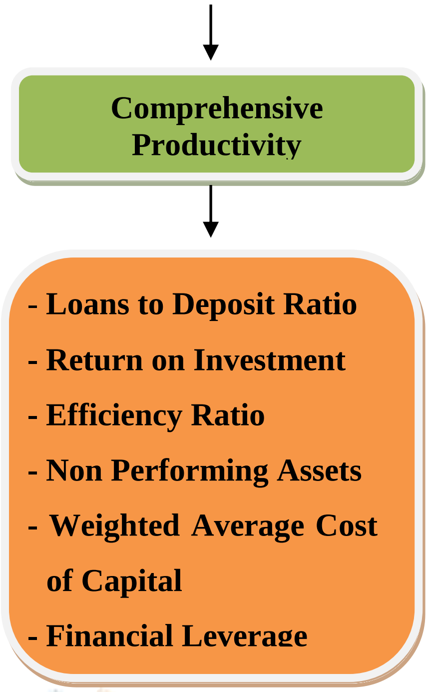
Random Sampling Techniques is used in present study. Present Study focused on Impact of Covid-19 on Productivity of Indian Public and Private Sector Banks. Researcher has selected 2 leading public banks i.e. SBI and BOB out of 12 Public sector banks and 2 well-known private banks i.e. HDFC and ICICI out of 21 Private sector banks. Selected sample banks of both Public Sector and Private Sector category are the leading banks as per the parameters like Market Cap (on 1st Sep, 2023 4.00 PM), Net Sales, Total Assets and Net Profit.

3.7 Study Design

The Present Study is quantitative research that examines impact of Covid-19 on the Productivity of Indian Public and Private Sector Banks.

Chart-1 Showing Bank Productivity Pre and During Covid-19





(Source: Researcher's own compilation)

3.8 Data Collection Method

The present Study is based on reliable and authentic secondary sources of data. The data collected from Published Annual Reports of Public & Private Sector Banks, IBA Bulletin, Magazines, Books, Journals and Websites etc.

3.9 Tools and Techniques for Data Analysis

Researcher has used Statistical Tools and Software for analysis and interpretation of data. Ratio Analysis is used to analyze data collected from various sources and Statistical Tool i.e. ANNOVA two factors with replication is used at 5% significance level for interpretation of data. MS Excel is used for two-way analysis.

3.10 Hypothesis of the Study

(1) **H_0**: There is no significant difference between and within Pre and During Covid-19 Pandemic duration among Comprehensive Productivity of selected Public and Private Sector Banks in India.

(2) **H_0**: There is no significant difference between and within selected Public and Private Sector Banks in India among Comprehensive Productivity Pre and During Covid-19 Pandemic.

(3) **H_0**: There is no significant difference between Public and Private Sector Banks in India and Pre and During Covid-19 Pandemic among Comprehensive Productivity.

3.11 Description of Variables

In Present research study Covid-19 pandemic and time duration are considered as Independent variables. Comprehensive productivity parameters are dependent variables for present research.

4 Data Analysis & Interpretation

Researcher has analysed Productivity of selected Indian Public and Private Sector Banks Pre and During Covid-19 in Comprehensive way. Comprehensive Productivity Analysis of Bank involves deep insight related to Banking Operations, Efficiency and Financial Performance.

Table-1: Showing Productivity Indicators

Comprehensive Productivity	Mathematical Formula
1. Loans to Deposits Ratio	Total Loans / Total Deposits
2. Return on Investment Ratio	Income From Investment / Investment
3. Efficiency Ratios	Total Advances / Total Deposits Net Profit / No. of Employees Business (Deposits + Advances) / No. of Employees Net Income / Shareholder's Equity Operating Expenses / Operating Income
4. Non Performing Assets	Gross NPA / Total Advances
5. Weighted Average Cost of Capital (WACC)	Cost of Equity = $R^f + B\ (r_m - r_f)$ Cost of Debt = Interest Expenses / Total dept(1-t) WACC = Total Cost of Capital (Cost of Equity + Cost of Debt) / Total Capital*100
6. Financial Leverage	Earnings before Interest & Tax / Earning Before Tax

(Source: Compiled by researcher)

Data Analysis & Interpretation

Comprehensive Productivity Analysis

1. Loans to Deposits Ratio
2. Return on Investment Ratio
3. Efficiency Ratios
4. Non Performing Assets
5. Weighted Average Cost of Capital
6. Financial Leverage

Table -2: Loans to Deposit Ratio (in %) of Selected Public and Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	76.83	63.70	86.16	94.73
	2017-18	71.49	72.28	83.46	91.34
	2018-19	75.08	73.40	88.76	89.85
During Covid-19	2019-20	71.73	72.95	86.60	83.70
	2020-21	66.54	73.04	84.85	78.68

	2021-22	67.48	74.30	87.79	80.69

(Source: www.moneycontrol.com and Compiled by researcher*)*

Loans to Deposit Ratio depict bank's liquidity by comparing bank's total loans to its total deposits for the same period. A high LDR indicates that a bank is more aggressive in its lending practices resulting higher risk for banks against customer deposits. On other hand, a low LDR indicates that a bank is not lending out enough money which can result in lower profits but also lower risk.

As shown in Table-2, it is observed that in both Public and Private Sector Banks, Loans to Deposit Ratio has declined during Covid-19 as compare to Pre Covid-19 that indicates the bank may not be earning as much as it could be because people were withdrawing their savings and also taking loans due to unforeseen fund requirements during Covid-19. Low LDR of banks' shows inadequate liquidity to cover loans in the event of an economic downturn due to Covid-19 which may result in loan defaults.

Table-3: Return on Investment Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	6.29	8.17	7.43	7.04
	2017-18	6.63	6.39	6.70	5.70
	2018-19	7.69	7.01	6.88	6.16
During Covid-19	2019-20	6.51	6.59	5.27	5.88
	2020-21	5.90	6.54	5.23	5.88
	2021-22	5.73	5.58	5.72	5.29

(Source: www.moneycontrol.com and Compiled by researcher*)*

Return on Investment Ratio measures the effectiveness or profitability of an investment by comparing the net profit / loss to its cost. Higher ROI of bank shows sound financial efficiency, ability to manage financial risk and grow banking business.

As shown in Table-3, it is found that Covid-19 had a substantial negative impact on ROI of both Public and Private Sector Banks. ROI has declined during covid-19 due to economic downturn and severely damaged banking operations resulted lower demand for capital and non-interest income of banks.

Table-4: Efficiency Ratio (in %) of Selected Public & Private Sector Banks

Table-4.1: Total Advances to Total Deposits (in %)

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	0.77	0.64	0.86	0.95
	2017-18	0.71	0.72	0.83	0.91
	2018-19	0.75	0.73	0.89	0.90
During Covid-19	2019-20	0.72	0.73	0.87	0.84
	2020-21	0.67	0.73	0.85	0.79

	2021-22	0.67	0.74	0.88	0.81

(Source: www.moneycontrol.com and Compiled by researcher*)*

Total advances to total deposits ratio depict bank's liquidity by comparing bank's total advances to its total deposits for the same period. A high advances to deposits ratio indicates that a bank is more aggressive in its lending practices resulting higher risk for banks against customer deposits. On other hand, a low LDR indicates that a bank is not lending out enough money which can result in lower profits but also lower risk.

As shown in Table-4.1, it is observed that in both Public and Private Sector Banks, Advances to Deposit Ratio has declined during Covid-19 as compare to Pre Covid-19 that indicates the bank may not be earning as much as it could be because people were withdrawing their savings and also taking loans due to unforeseen fund requirements during Covid-19. Low LDR of banks' shows inadequate liquidity to cover loans in the event of an economic downturn due to Covid-19 which may result in loan defaults.

Table-4.2: Net Profit to Total Number of Employees (in %)

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	5.00	2.64	17.25	11.83
	2017-18	-2.48	-4.42	19.81	8.19
	2018-19	-0.27	0.78	21.49	3.88
During Covid-19	2019-20	5.81	0.65	22.44	7.99
	2020-21	8.31	1.01	25.91	16.40
	2021-22	12.97	9.19	26.11	22.05

(Source: www.moneycontrol.com and Compiled by researcher*)*

Net Profit Per employee ratio is measured by dividing Net Profit by total number of employees of sample banks. This ratio represents amount of profit generated by each employee for the bank. Higher ratio indicates high employee productivity of bank and also indicates that bank is earning good Profit due to efforts of employees. On the other hand, a low Net Profit Per employee ratio indicates low employee productivity.

As Shown in Table 4.2, it is observed that in both Public and Private Sector Banks, Net Profit per Employee ratio has increased during Covid-19 as compare to Pre Covid-19 that indicates that during pandemic time bank has reduced branch operations and shifted to digital transactions reduced operational cost and increase profitability.

Table-4.3: Net Business to Total Number of Employees (in %)

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	17.25	18.79	14.21	11.52
	2017-18	17.58	18.52	16.40	12.98
	2018-19	19.81	19.86	17.77	14.29
During Covid-19	2019-20	22.32	19.41	18.31	14.26
	2020-21	24.96	20.41	20.55	16.87
	2021-22	27.78	23.03	20.68	18.17

(Source: www.moneycontrol.com and Compiled by researcher*)*

Net Business to total number of employee ratio depicts bank's business per employee. Business includes total deposits plus total advances. A high Business per employee ratio indicates that each employee is highly productive and contributes to increase Profitability of Bank and vice versa.

As shown in Table-4.3, it is observed that in both Public and Private Sector Banks, Business per employee Ratio has increased during Covid-19 as compare to Pre Covid-19 that indicates that banks has adopted digitalization and due to that operating cost decreases. Banks has adopted various costs cutting measures to maintain profitability of banks during pandemic time.

Table-4.4: Return on Net Worth (in %)

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	6.69	3.43	16.26	10.11
	2017-18	-3.37	-5.60	16.45	6.63
	2018-19	0.39	0.94	14.12	3.19
During Covid-19	2019-20	6.95	0.76	15.35	6.99
	2020-21	8.86	1.07	15.27	11.21
	2021-22	12.33	8.46	15.39	13.94

(Source: www.moneycontrol.com and Compiled by researcher*)*

Return on Net worth Ratio depicts bank's efficiency and profit earning capability on share holder's invested fund by comparing bank's Net Income to Share holder's equity for the same period. A high Return on Net Worth indicates that a bank is efficiently utilizing its capital to generate high amount of return for its share holders. High ratio depicts sound financial health and overall performance and vice versa. Consistently low return on net worth ratio may affect profitability and long term sustainability of Bank.

As shown in Table-4.4, it is observed that in Public and Private Sector Banks, Return on Net worth Ratio has increased during Covid-19 as compare to Pre Covid-19 that indicates that Banks has adopted cost cutting measures, operational expenses declined due to digitalization, reduced loan loss provisions due to government support. These measures increased over all efficiency of banks and increased return on net worth.

Table-4.5: Cost to Income Ratio (in %)

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	41.15	38.58	37.84	42.68
	2017-18	47.52	48.92	39.62	46.51
	2018-19	44.68	43.41	38.41	48.98
During Covid-19	2019-20	42.57	43.13	38.52	45.79
	2020-21	43.34	48.69	40.37	42.57
	2021-22	41.00	45.26	41.05	40.65

(Source: www.moneycontrol.com and Compiled by researcher*)*

Cost to Income Ratio depicts bank's liquidity and Profitability by comparing bank's total operating expenses to its total operating income for the same period. A high cost to income ratio indicates that a bank is not able to earn enough profit to meet its expenses. Further A high cost to income ratio also indicates that a bank is spending more amounts in operating expenses like rent, salaries and other operating expenses as compare to its income. This may affect overall profitability of Bank. On other hand, a low cost to income ratio indicates proper cost management of bank and due to that Bank is able to generate income and keep its expenses under control.

As shown in Table-4.5, it is observed that in both Public and Private Sector Banks, cost to Income Ratio is not increased and not much decreased during covid-19 duration as compare to Pre Covid-19 duration. It is observed that both Public and Private Sector Banks were struggling to maintain Cost to Income Ratio because of economic uncertainty and financial distress during pandemic time.

Table-5: Non Performing Assets (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	3.71	4.72	0.33	5.43
	2017-18	5.73	5.49	0.40	5.43
	2018-19	3.01	3.33	0.39	2.29
During Covid-19	2019-20	2.23	3.13	0.36	1.54
	2020-21	1.50	3.09	0.40	2.10
	2021-22	1.02	1.72	0.32	0.81

(Source: www.moneycontrol.com and Compiled by researcher*)*

Non Performing Assets Ratio depicts bank's financial health, ability to manage credit risk and overall reputation. A high Non Performing Assets ratio indicates that major portion of bank loans are not being repaid or may be risk of default. High NPA'S adversely affected on Profitability, liquidity, capital adequacy position and reputation of bank. On other hand, a low Non Performing Assets ratio indicates that a bank is properly managing its loan portfolio. Low Non Performing Assets Ratio indicates that bank's has to keep less amount as reserve for loan default, which positively contribute to Bank's profitability, liquidity, creditworthiness, increased lending capacity and survival.

As shown in Table-5, it is observed that in both Public and Private Sector Banks, Non Performing Assets Ratio has declined during Covid-19 as compare to Pre Covid-19. Reason behind decreasing NPA in both banks during Covid-19 is due to various regulatory relief measures, loan moratorium and loan restructuring imposed by RBI to support borrowers facing financial crisis during pandemic time.

Table -6: Weighted Average Cost of Capital (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	3.58	2.92	4.48	6.42
	2017-18	1.29	3.80	1.65	-1.85
	2018-19	2.92	3.47	3.89	5.68
During Covid-19	2019-20	2.43	4.51	2.13	0.23
	2020-21	2.44	0.70	2.99	2.02
	2021-22	2.92	3.06	3.18	3.23

(Source: www.moneycontrol.com and Compiled by researcher*)*

Weighted Average Cost of Capital represents banks after tax cost of capital form shares, bonds and debts. Weighted Average Cost of Capital is the minimum return that Banks need to generate for its shareholders and creditors. A high Weighted Average Cost of Capital indicates difficulty for bank to raise fund for investors and shareholders and bank may lose certain investment opportunity because return on investment is less then high WACC and vice versa.

As shown in Table-6, it is observed that in both Public and Private Sector Banks, Weighted Average Cost of Capital has declined during Covid-19 as compare to Pre Covid-19. Reason behind decreasing WACC during Covid-19 is RBI declined interest rate to support bank and overall economy. That reduced borrowing cost for bank. RBI also introduced various support measures, due to that Banks are able to earn enough wealth for its stakeholders. Low WACC creates positive impact on Bank.

Table-7: Financial Leverage Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	3.42	4.44	1.16	2.35
	2017-18	-3.48	-4.30	1.22	3.33
	2018-19	33.51	19.32	1.23	6.21
During Covid-19	2019-20	2.47	-10.93	1.33	2.00
	2020-21	2.54	3.71	1.38	1.80
	2021-22	1.73	2.39	1.31	1.28

(Source: www.moneycontrol.com and Compiled by researcher*)*

Financial Leverage depicts banks dependency on debt or equity financing by comparing banks Earnings before interest and tax to Earning before tax for the same period. A Bank with high Financial Leverage has major portion of assets financed by debt financing and it may increase profitability but also incur risk of insolvency. On other hand, a Bank with low financial leverage has less dependency on debt financing and reduced risk of insolvency. Low financial leverage provides stability to bank during economic crisis.

As shown in Table-7, it is observed that in both Public and Private Sector Banks except HDFC Bank, Financial Leverage has declined during Covid-19 as compare to Pre Covid-19 that indicates that banks prefer its safer side to reduce its dependency on debt financing to maintain stability and to mitigate risk arises due to pandemic situation.

5 Findings

Table- 8: Findings of (Comprehensive Productivity Parameters) ANNOVA two factor with Replication @ 5% Significance Level

No	Comprehensive Productivity Parameters	F Value	F crit	Result	Null Hypothesis H_0 Accepted/Rejected
1	**Loans to Deposit Ratio**				
	• Pre & During Covid-19(Due to Raw)	7.62	4.49	F 7.62 > F crit 4.49	H_{01} is Rejected*
	• Public & Private Sector Banks(Due to Columns)	53.52	3.24	F 53.51 > F crit 3.24	H_{02} is Rejected*
	• Covid-19 & Sample Banks (Interaction)	7.69	3.24	F 7.69 > F crit 3.24	H_{03} is Rejected*
2	**Return on Investment Ratio**				
	• Pre & During Covid-19(Due to Raw)	18.09	4.49	F 18.09 > F crit 4.49	H_{01} is rejected*
	• Public & Private Sector Banks(Due to Columns)	1.75	3.24	F 1.78 < F crit 3.24	H_{02}isAccepted**
	• Covid-19 & Sample Banks (Interaction)	0.81	3.24	F 0.81 < F crit 3.24	H_{03} is Accepted**
3	**Efficiency Ratio**				
	• Pre & During Covid-19(Due to Raw)	27.41	3.96	F 27.41 > F crit 3.96.	H_{01} is Rejected*
	• Public & Private Sector Banks(Due to Columns)	179.2	1.72	F179.20 > F crit 1.72	H_{02} is Rejected*
	• Covid-19 & Sample Banks (Interaction)	2.03	1.72	F 2.03 > F crit 1.72	H_{03} is Rejected*

4	**Non Performing Assets Ratio**				
	• Pre & During Covid-19(Due to Raw)	20.45	4.49	F 20.45 > F crit 4.49	H_{01} is Rejected*
	• Public & Private Sector Banks(Due to Columns)	12.17	3.24	F 12.17 > F crit 3.24	H_{02} is Rejected*
	• Covid-19 & Sample Banks (Interaction)	2.52	3.24	F 2.52 < F crit 3.24	H_{03} is Accepted**
5	**Weighted Average Cost of Capital**				
	• Pre & During Covid-19(Due to Raw)	0.76	4.49	F 0.76 < F crit 4.49	H_{01} is Accepted**
	• Public & Private Sector Banks(Due to Columns)	0.11	3.24	F 0.11 < F crit 3.24	H_{02} is Accepted**
	• Covid-19 & Sample Banks (Interaction)	0.17	3.24	F 0.17 < F crit 3.24	H_{03} is Accepted**
6	**Financial Leverage Ratio**				
	• Pre & During Covid-19(Due to Raw)	1.83	4.49	F 1.83 < F crit 4.49	H_{01} is Accepted**
	• Public & Private Sector Banks(Due to Columns)	0.44	3.24	F 0.44 < F crit 3.24	H_{02} is Accepted**
	• Covid-19 & Sample Banks (Interaction)	0.39	3.24	F 0.39 < F crit 3.24	H_{03} is Accepted**

(Source: Researchers own compilation using M S Excel)

*****If Null Hypothesis H_{01} is accepted than there is no significant difference between and within Pre and during Covid-19 Pandemic duration among Concerned Ratio of selected Public and Private Sector Banks in India.

*****If Null Hypothesis H_{02} is accepted than there is no significant difference between and within selected Public and private sector banks in India among Concerned Ratio pre and during Covid-19 Pandemic.

*****If Null Hypothesis H_{03} is accepted than there is no significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among Concerned Ratio.

******If Null Hypothesis H_{01} is rejected than there is significant difference between and within Pre and during Covid-19 Pandemic duration among Concerned Ratio of selected Public and Private Sector Banks in India.

******If Null Hypothesis H_{02} is rejected than there is significant difference between and within selected Public and private sector banks in India among Concerned Ratio pre and during Covid-19 Pandemic.

**If Null Hypothesis H_{03} is rejected than there is significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among Concerned Ratio.

Table- 9 shows Findings of Hypothesis testing Results. Researcher has used ANNOVA two factors with replication at 5% level of Significance to identify whether any significant difference happened in Productivity of Public and Private Sector Banks between Pre Covid-19 and During Covid-19 duration. Researcher found that there is significant difference between and within Pre and during Covid-19 Pandemic duration in case of Loans to Deposit Ratio, Return on Investment Ratio, Efficiency Ratio & Non Performing Assets Ratio. There is no significant difference between and within Pre and during Covid-19 Pandemic duration in case of weighted average cost of capital and financial leverage. There is significant difference between and within selected Public and private sector banks in India among LDR, Efficiency Ratio and NPA, pre and during Covid-19 Pandemic. There is no significant difference between and within selected Public and private sector banks in India among ROI, WACC and Financial Leverage pre and during Covid-19 Pandemic. There is no significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among ROI, NPA, WACC and Financial Leverage. There is significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among LDR and Efficiency Ratio.

6 Conclusion

Researcher has conducted research to measure impact of covid-19 on Productivity of two public sector banks and two private sector banks from 2016-17 to 2021-22 including 3 years from 2016-17 to 2018-19 before covid-19 and 3 years from 2019-20 to 2021-22 during covid-19. Researcher found that covid-19 pandemic has had a significant impact on productivity performance of Public and Private sector banks. This is pointed out by significant difference in 4 comprehensive Productivity parameters including Loans to Deposit Ratio, Return on Investment Ratio, Efficiency Ratio & Non Performing Assets Ratio. There is significant difference in Performance of Public sector and Private sector banks in Productivity parameters including LDR, Efficiency Ratio, and NPA.

Therefore on the basis of above research results, Banks need to improve their Productivity Performance in post covid-19 duration to increase Profitability and overall Performance of Banks. Reserve Bank of India and Indian Government must have to pay attention on banks which faces difficulties based on their financial parameters due to occurrence of covid-19 pandemic. Both Public and Private sector Banks faced major or moderate impact of covid-19 due to ownership, operational and Regulative differences.

These results suggests that both Public and Private sector banks have to pay attention on their capital, liquidity and risk management aspect for batter performance and lowering Bank risk.

7 Limitations and Future Research

The Scope of study included only 6 years from 2016-17 to 2021-22. The Study is based on Secondary data. Therefore accuracy is depending on accuracy of secondary data used. The focus of Present study is only on the Productivity of 2 public sector banks SBI, BOB and 2 private sector banks HDFC, ICICI Bank. There is Scope for future research. In present research there is scope to enhance study period for clearer picture of Covid-19 impact on Bank. Further, Researcher can use primary data and other evaluation parameters for batter result. Researcher can work on other parameters for evaluation and also include foreign banks and Regional rural banks in their sample for study.

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