

Seminar Paper On

**“Macro- Economic factors as a
determinant of profitability of Indian
banks”**

Shaifali

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Supervisor: Dr. Girish Bahal

Abstract

The Objective of the paper is to examine the impact of the Macro-Economic Factors on the Profitability of Public Sector Banks by using empirical Framework. The period of study is 20 Years, from 2003 to 2022. Return on Assets (ROA) and Return on Equity (ROE) are taken as proxy for profitability of Banks. While GDP growth rate and Inflation (CPI) are taken as Macro- Economic factors. Bank Size being used as one of the control variable. The data is panel in nature. Regression analysis is carried out to understand the relation between measures of profitability and its indicators. There is a problem of correlation in panels, and in order to correct that panel correlated standard errors (PCSE) being estimated. There is a problem of Endogeneity and panels found to be correlated, hence in order to correct these problem, Instrumental variables being Employed as a lagged of independent variables. The results indicates that Both GDP and Inflation are impacting measures of profitability. Banking Sector Reforms been used to determine their impact as well. One is Inderdhanush Scheme and other is EASE (Easy Access and Surveillance Experience).

Motivation

Banks play crucial role in economic growth of any country and considered as heart of the financial system. Hence, it is necessary to ensure that Banks witness enough profit margin, which depend on both internal & external factors. There exist various Bank specific factors (internal factors) such as bank Size, Liquidity, Bank Capital, Credit risk which has direct impact on bank profitability. But there exist some external factors as well such as GDP growth Rate and Inflation rate which indirectly impacts bank Profitability. My Objective is to study these external factors as macroeconomic factors to determine its influence on banks profitability. My study would focus on the influence of GDP-growth & inflation on the bank profitability along with Bank Size as a control variable.

Introduction

In this paper, I carried out my work for eleven (11) public Sector Banks namely State Bank of India, Punjab National Bank, UCO bank, Bank of Baroda, Bank of Maharashtra, Canara Bank, Central Bank of India, Indian Bank, Indian Overseas Bank, Union bank Of India and Bank of India. I restricted my work for public sector banks only. With the help of graph line, it has been found that there is a steep decline in ROA and ROE values from 2016 onwards and subsequently steep increase in both ROA and ROE from 2019s onwards.

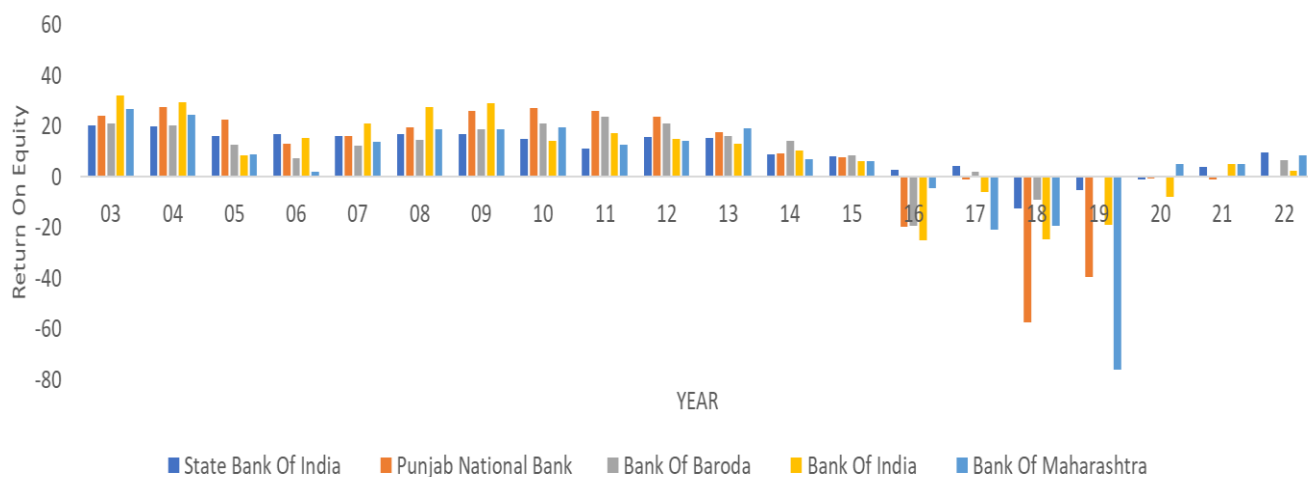
This paper is divided into 8 sections. Section 4 throws light on the Trend analysis. Section 5 discusses Literature Review. Section 6 talks about the model specifications. Section 7 discusses the results and Section 8 concluded the results.

Trend Analysis

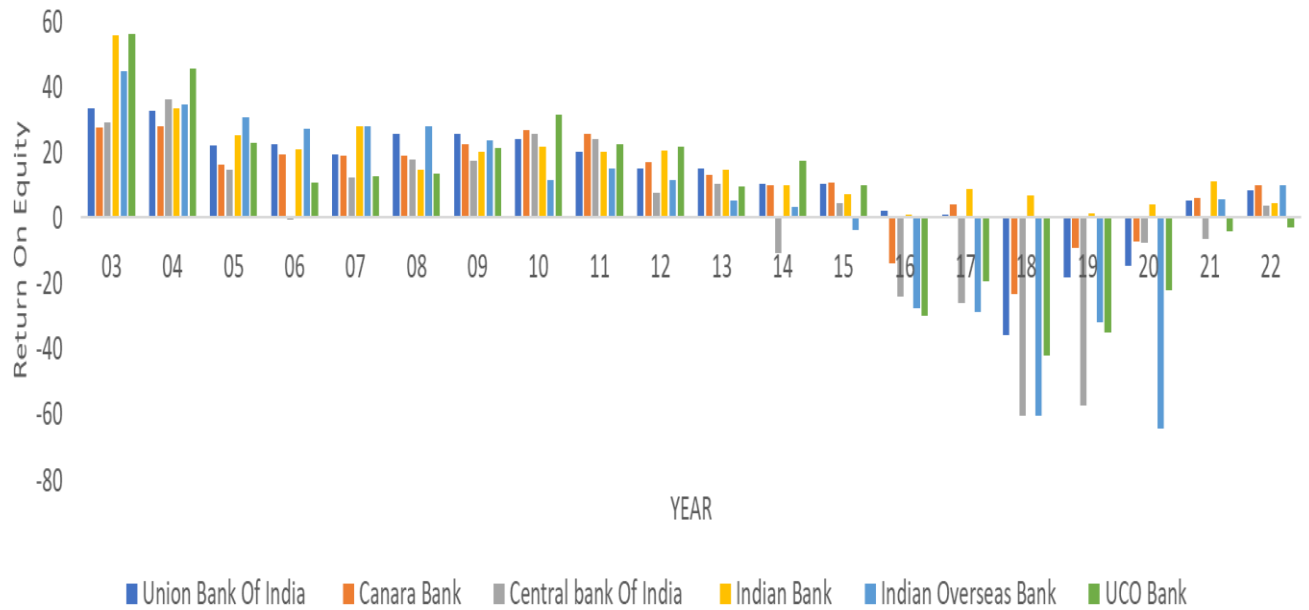
According to the sources, Public Sector Banks cumulative profit crossed the Rs 1 lakh crore mark in financial year 2023, with biggest public lender 'State Bank of India' accounting for nearly half of the total earnings. I analysed the trends of profit margin of all public sector banks during the period of study from 2003 to 2022.

Return On Equity Trends

Return on Equity (ROE) keeps on fluctuating for the entire time period. In the first graph, I considered top five public sector banks and found steep decline in ROE from 2016 period onwards. May be because of demonetisation shocks but at the same time government also introduced Indra Dhanush Scheme for the profitability of PSBs. Hence, in order to capture that scenario Dummy being used.

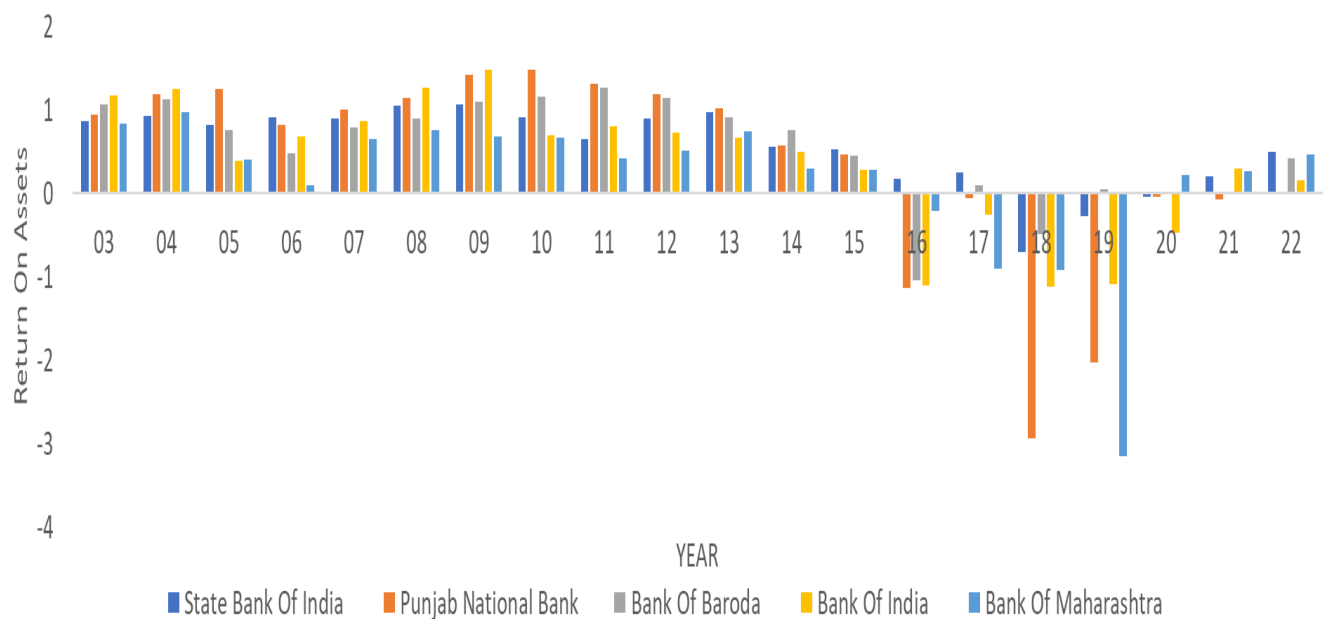


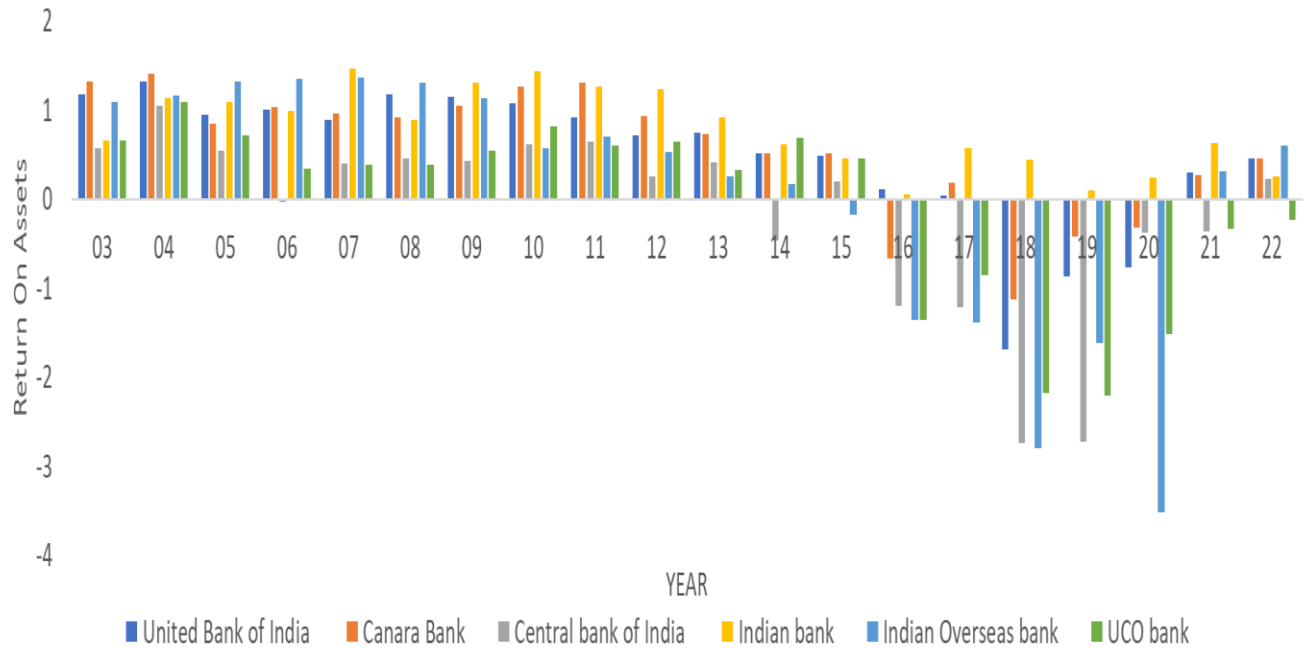
Similar case witness for the UCO and Union bank Of India as well. Dummy for EASE scheme being introduced in order to capture the positive trend from 2019 onwards.



Return on Assets Trends

Like ROE, the trend analyses of ROA also showing similar results. Return on Assets keep fluctuating for given period of study from 2003 to 2022. But showing steep decline (negative values) from the year 2015 onwards. Bank Of Maharashtra witness maximum negative fall of about 3%. Similarly, ROA start becoming positive after 2019. Bank of Baroda is special case in which ROA not indicating large negative fall after 2015 onwards. It fall by just -1% in year 2016.



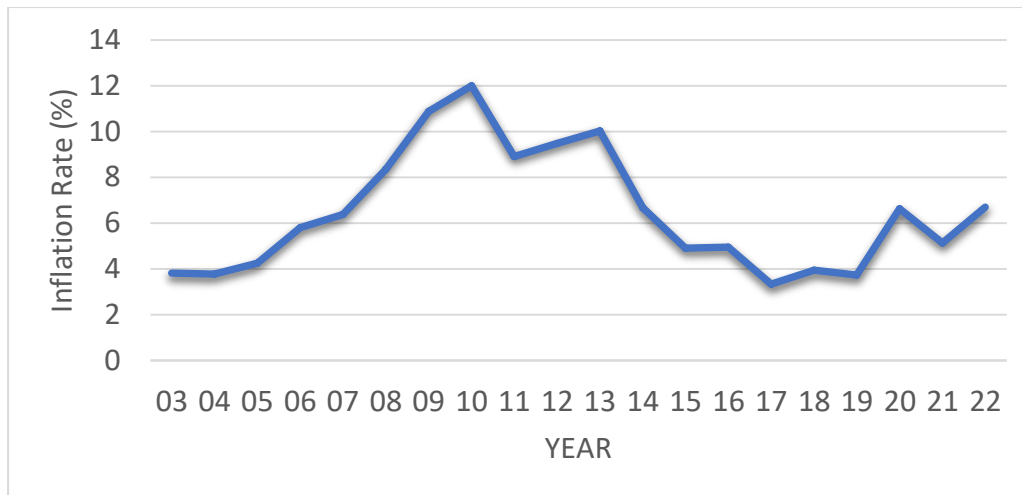


Returns on Assets (ROA) indicate very steep decline (negative) for Indian Overseas bank from 2015 onwards and have steep positive slope from year 2020 onwards. On the contrary, SBI indicated less fluctuations in terms of returns and witnessed about -1% returns on the year 2018.

From this Trend Analysis, it can be stated that among all public sector banks, Indian bank & State Bank of India (SBI) witnessed minimal negative returns over the whole study period may be because of healthy balance sheet and efficient functioning.

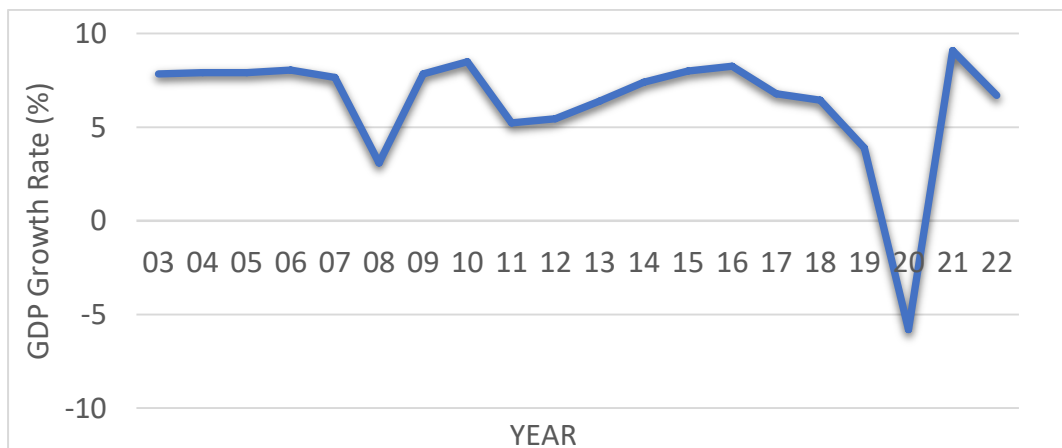
Trend Analysis of Inflation

From the given graph line, it can be stated that Inflation has shown positive trend till 2010 & economy witnessed maximum inflation rate 12% during the year 2010. Then, it has shown a steep decline since 2015. it is showing downward trend. One of the reasons could be fall in domestic markets during demonetisation shock.



Trend of GDP

GDP keep on fluctuating over the study time period from 2003 to 2022. It has taken steep negative decline of (-6)% during the year 2020 especially because of low investments. But, after the recession period of 2020, it again took positive trend and increased to 8% in the year 2021.



Literature Review

Profitability is an important indicator of the health of banking sector. It is also important for the supervisors of the banking systems as well because to a large extent it also indicates the risk involved in the activity. The factors determining profitability vary across countries and across time line. A number of studies have been carried out to understand the drivers of profits for a bank.

A paper by Ranajee (2018) on the “Factors influencing profitability of Indian banks” empirically analyzed the factors determining profits for the 89 Commercial Banks in India (Government & Non- Government) during the period 2005 to 2015 using the balanced panel dataset. ROE and ROA taken as proxy for the bank’s profitability. Study indicates that profitability for banks depend upon on both internal and external factors. Pooled OLS regression being done. Inflation coming out to be significant and positive for ROE.

A paper by Dr. Hemal Pandaya (2014) on the topic “Profitability analysis of Selected nationalised banks In India accessed and evaluated the determinants of profits for the selected five Indian Nationalized Banks using multiple regression and factor analysis technique during the period 2000 to 2010.

For the purpose of study, financial ratios of different banks been considered. The study suggests that there are five common factors across banks which affect their profitability and it further shows that profitability fluctuates over the period of study. Correlation and Multiple Regression Analysis approach used.

A paper by Mohammad Athar Ali & Rohit Bansal (2022) on “Analysing the performance of banks in India: Robust Regression Analysis” approach accessed the impact of Bank specific factors and macroeconomic factors to determine the finance performance of Public Sector Banks using Robust Regression Technique. Return On assets (ROA) & Net Interest Margin (NIM) considered as proxy for profits. Empirical findings suggested that among macroeconomic factors GDP growth rate had no significant impact on ROA while inflation(CPI) had positive impact on bank performance.

“Impact Of Inflation on profitability of Public Sector Banks” by Prof. Jeevitha & Dr. Binoy Mathew (2019) determined impact of inflation on profits and how profit level influence the investment decision of bank’s lending. WPI used as measure for inflation rate. Data being taken for the time period 2014- 2018. ROA, ROE and NIM taken as proxy for the profitability. Study took place for five public sector banks. Correlation used as a tool of testing and ANOVA is employed and results indicated that there is no relation between profitability and inflation.

A paper on “Profitability of Public Sector Banks In India:” A study on determinants of profitability using both bank specific and macro economic specific undertaken by KP Venugopala Rao (2018). CAMELS model being used for bank specific factors while GDP, WPI & Per capita net national income growth rate used as macro economic factors. Random effect model performed which assumed variations across entities to be random & uncorrelated with independent variables. Panel EGLS method being used. Results were not significant for macro- economic factors while some of bank specific factors come out to be significant such as Asset Quality, Earnings Quality & Sensitivity to Market Risk.

A paper by Dhananjay Bapat (2017) on Profitability drivers Of Indian banks: A dynamic Panel data Analysis analyzed the profitability of Public and Private sector banks on the basis of bank specific factors and Macroeconomic factors for the time period 2006-2012. ROA & ROE considered as proxy for profitability. GMM model being used to control for endogeneity issues and for consistent estimates. Among the Bank Specific Factors Non performing loans and cost to income ratio negatively impacted profitability of banks while diversification do not affected the profitability. Both GDP & inflation impacting ROA but not ROE.

A paper on “bank specific, Industry specific and macro specific factors as a determinants of profitability of Public sector banks” by A. Subbarayan considered ROA as profitability measure. Panel data consist of PSB’s for the period 2010-2015. GDP and Inflation used as macro-economic factors. Pooled OLS method being undertaken to determine the results. Among macro factors, Inflation had positive impact on banks profitability.

Data & Methodology

In this paper, Study is restricted to Public Sector Banks only. In present there are 12 Public Sector Banks. But I found data for profitability measures namely, Return on Equity (ROE) & Return on Assets (ROA) for 11 banks only except Punjab & Sind Bank. If we talk about data source, Return on Equity , Return on Assets and Bank Size are taken from CMIE Prowess.

While data for Inflation (CPI) and GDP has been taken from World Bank data source. The period of study is 20 years from 2003 to 2022. The frequency of data is annual. Panel data approach being used in my study.

Parameters through which GDP, Inflation and Bank Size determine Bank profitability:

1) Interest Rate Sensitivity:

Banks' profitability is heavily influenced by interest rates. Changes in GDP and inflation often lead to changes in interest rates, affecting the spread between interest earned on assets and interest paid on liabilities, directly impacting profitability.

2) Economic Stability:

A strong or growing GDP often indicates a favorable economic environment, which can positively influence a bank's profitability.

3) Risk Assessment:

GDP growth and inflation can serve as an indicator of potential risks and uncertainties in the economy. High inflation rates might increase costs for banks, impacting profitability, while economic growth can present opportunities for increased lending and investment activities.

4) Monetary Policy Impact:

Monetary policies, influenced by GDP and inflation, can significantly impact banks' operations and profitability. Central banks adjust interest rates and other monetary tools to manage inflation and stimulate or cool down economic growth, directly affecting banks' interest income and expenses.

5) Economies of Scale :

Larger banks often benefit from economies of scale, which can lead to cost advantages. As a bank grows in size, it can spread its fixed costs (e.g., infrastructure, technology) over a larger customer base, potentially reducing its per-customer cost and improving profitability.

Indicators & Variables

Variables	Measurement	Expected Sign
Dependent Variable		
ROE	Net Income/ Shareholder's Equity	
ROA	Net Income/ Total Assets	
Explanatory Variable		
GDP	Annual Growth Rate	Positive
Inflation	Annual CPI	Positive/ Negative
Control Variable		
Bank Size	Log of Total Assets	Positive/Negative
Instrumental Variable		
Lagged Variable	GDP L2 & Inflation L1	Positive

Model Specification:

As there are two dependent variables so there will be following two equations:

$$1) ROE_{it} = c + \alpha(GDP_t) + \beta(INF_t) + \gamma(Size)_{it} + \epsilon_{it}$$

$$2) ROA_{it} = c' + \alpha'(GDP_t) + \beta'(INF_t) + \gamma'(Size)_{it} + \omega_{it}$$

where, ROE_{it} stands for return on equity for i th bank in t th year.

ROA_{it} stands for return on asset for i th bank in t th year.

GDP_t stands for gross domestic product in t th year.

INF_t stands for inflation in t th year.

$Size_{it}$ stands for Bank size for i th bank in t th year.

ϵ_{it} and ω_{it} are error terms.

Since, Variables being standardized which would help to compare the relative importance of different predictors in the model since they are on the same scale. Interpretation of the coefficients becomes more straightforward.

Hence, model being transformed by using formula:

$$Z = (X - Xbar) / \sigma_x$$

Now transformed Model is:

$$roe_sd = c + \alpha(gdp_sd) + \beta(inf_sd) + \gamma(size_sd) + \epsilon_{it}$$

$$\text{roa_sd} = c' + \alpha'(\text{gdp_sd}) + \beta'(\text{inf_sd}) + \gamma'(\text{size_sd}) + \omega \text{it}$$

Steps followed:

Step1: OLS model is used on the standardized variables.

Step2: To check if OLS model can be accepted BREush and Pagan Test is done.

Step3 : If OLS being rejected then equation being estimated using fixed effect or random model as suggested by Hausman.

Step3: For correction of endogeneity, Instrumental variables being employed as a lagged value of explanatory variable.

Step4 : Test for Heteroscedasticity being done.

RESULTS

Equation 1: Estimating results for ROA

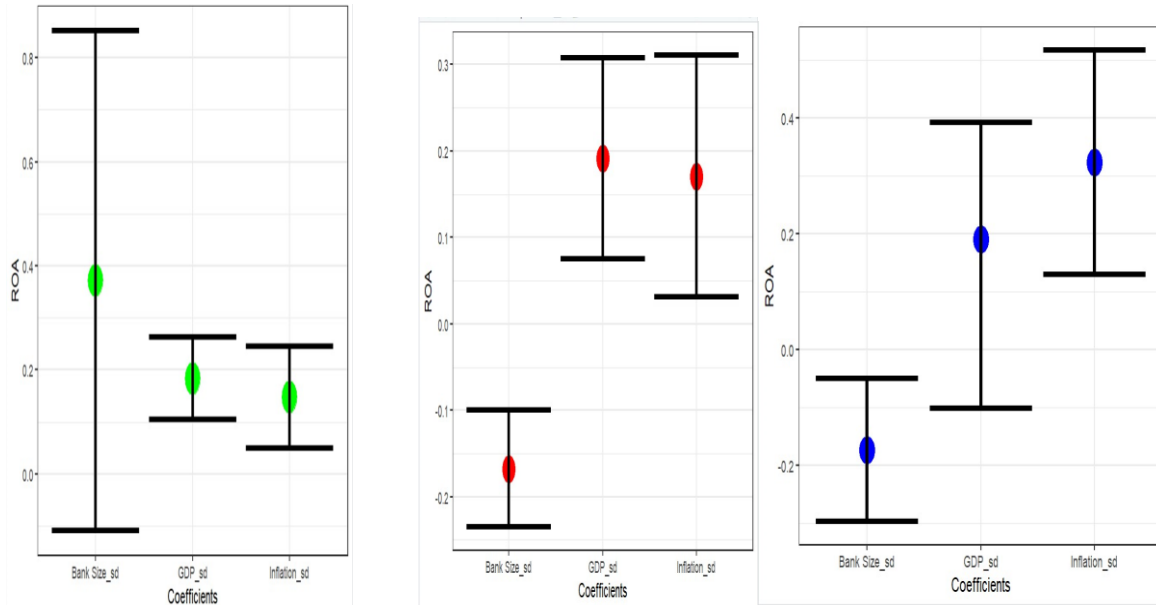
To estimate the equations three models being used, first is fixed effect then panel correlated standard errors and then through Instrumental variable (IV). In Fixed Effect model, coefficient of all the variables coming out to be significant even at one percent level. Trend variable also being incorporated which indicating trend of return on assets (ROA) to be negative in the whole study period.

Both Inderdhanush scheme and EASE scheme indicating significant results even at one percent level of significance. Inderdhanush scheme indicating negative impact on profitability of banks despite the fact that this is initiated with an aim to enhance the profitability of banks. May be because that from the year 2016 onwards Demonetisation shock came into picture which adversely impacted the profitability of banks. But EASE scheme gave significant positive results.

For PCSE results, Inflation coming out to be significant at 5% level of significance. While GDP gave significant positive results even at 1% level of significance.

In case of Instrumental variables (IV), both instrumented variables (GDP L.2 & inflation L.1) showing significant results , i.e influencing current value of explanatory variables.

After that endogeneity test also being done to check whether explanatory variables were actually endogenous in nature or not. We found that GDP and Inflation were actually endogenous in nature.



Coefficients plots being done for each of the case fixed effect, PCSE and IV test. Green plotting for fixed effect, Red plotting for PCSE test and Blue plotting for Instrumental variables. Coefficients value has risen for inflation (for which results are also coming out to be significant in each case). Similarly, confidence intervals bands also tends to reduced as we go towards IV model.

Equation 2: Estimating results for ROE

When Fixed model regression being done on transformed model, then all the explanatory variables showing significant impact on return on equity (roe). Inflation_sd, size_sd and trend variable coming out to be significant at one percent level of significance while gdp_sd showing positive impact at ten percent level of significance.

For PCSE model, which is more efficient than fixed effect model as it is corrected for the problem of correlation indicating that only GDP is determining impact on profitability.

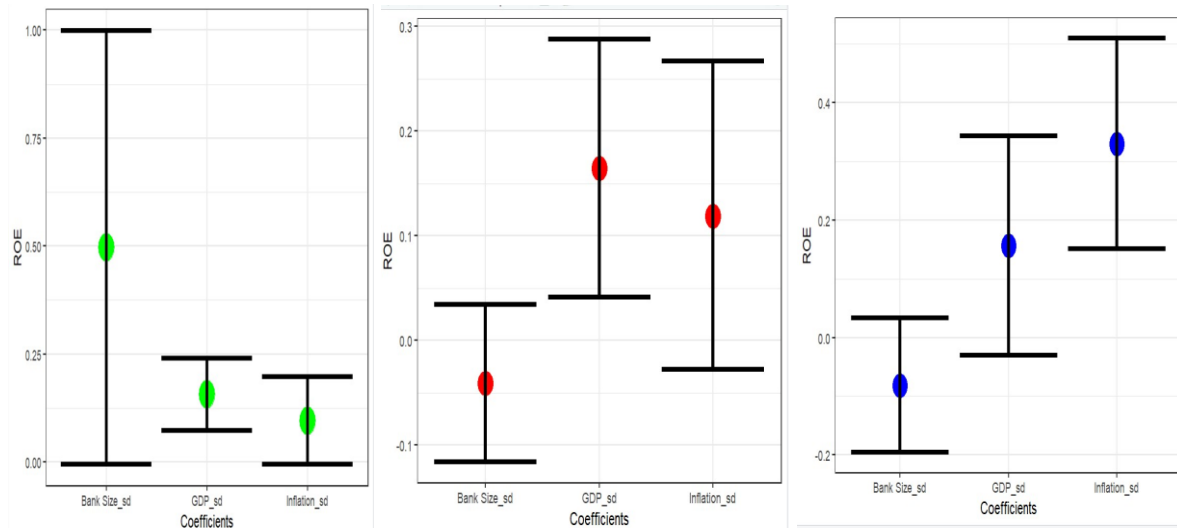
With the Instrumental Variable case, inflation coming out to be significant (positive) and both banking sector reforms giving significant results at one percent level.

Here, red symbols indicating coefficients for estimators by using PCSE results while Blue symbols indicating coefficients with Instrumental variables (IV). Here, it can be seen that coefficient for Inflation has risen in case of IV model.

While it has fall down to some extent for gdp although coefficients are not coming out to be significant for IV model.

Estimating Results for ROA

Variables	FE	PCSE	IV
inflation_sd	0.1475* (0.0493)	0.1708** (0.0712)	0.3233* (0.0986)
gdp_sd	0.1834* (0.0403)	0.1914* (0.0594)	0.1911*** (0.1027)
size_sd	0.3710 (0.243)	-0.1673* (0.0366)	-0.1736* (0.063)
trend	-0.1189* (0.0395)	-0.0366*** (0.0203)	-0.0361*** (0.0205)
Indu_Scheme	-1.0069* (0.1917)	-1.1606* (0.2643)	-0.9079* (0.2511)
EASE	1.3207* (0.1502)	1.1765* (0.2004)	1.0479* (0.2115)
Constt.	1.403* (0.3701)	0.6141* (0.1507)	0.5059* (0.1780)
inflation_sd L1			0.7476* (0.0595)
gdp_sd L2			-0.6265* (0.080)
N	220	220	198
adj. R sqr	0.524	0.653	0.633



Estimating Results for ROE

Variables	FE	PCSE	IV
inflation_sd	0.0959*** (0.0514)	0.1191 (0.0750)	0.3304* (0.0914)
gdp_sd	0.1564* (0.0421)	0.1644* (0.0626)	0.1561 (0.0952)
size_sd	0.4963*** (0.2543)	-0.041 (0.0383)	-0.0812 (0.0584)
trend	-0.1641* (0.0412)	-0.0819* (0.0215)	-0.0546 (0.0192)
Indu_Scheme	-0.8113* (0.2001)	-0.9646* (0.2786)	-0.7596* (0.2327)
EASE	1.436* (0.1568)	1.2923* (0.2112)	1.0226* (0.1960)
Constt.	1.792* (0.3864)	1.0046* (0.1646)	0.6034* (0.1649)
inflation_sd L1			0.7476* (0.0595)
gdp_sd L2			-0.6265* (0.080)
N	220	220	198
adj. R	0.544	0.663	0.633

General Observation:

- The main determinant of ROA are gdp, inflation and bank size. While Bank size has negative impact on profitability of banks.
- When we take ROE as a measure of profitability then, gdp is coming out to be significant.
- Both ROE and ROA are procyclical to GDP growth rate.
- Two period lagged values of gdp and one period lagged value of inflation giving significant variations in current time period.
- Banking Sector Reforms impacting significantly profitability of banks. Indra Dhanush scheme which was introduced in 2015, indicates negative impacts on profitability majorly because of demonetization shocks.
- Similarly, EASE scheme which was introduced in 2019, indicating positive impacts on profitability measures due to several versions of this reform been introduced over the time.

Limitation of the study:

- Endogeneity was the major concern here. Since, macro factors are impacted by their own lagged values, hence different lagged values being used for the correction of endogeneity.
- Different IVs experimented for the correction of endogeneity.
- Data for one of the bank was not available in the prowess site hence, variations on Punjab & Sind Bank was not determined.

Conclusion

Our banking sector is very vibrant and plays a major role in our economy. With the help of the study some of the key take away being determined:

- Fixed effect regression gives better result as compared to the overall pooled analysis.
- Inflation coming out to be important factor determining profitability at annual basis.
- Bank size has negative impact on profitability measures broadly because of the fear of risk of too big to manage.

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World Bank website

CMIE Prowess website