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DYNAMICS OF COST: AN ECONOMETRIC ANALYSIS OF PUBLIC AND PRIVATE SECTOR BANKS IN INDIA

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ABSTRACT
Banking activities has undergone a structural transformation in the last two decades. Apart from traditional banking activities there are other related financial services that the banks have now started to offer and various other investments that it has started to undertake. Such diversification has led to the dynamics of cost to change over time and has now been proved to be sensitive to other elements present in the balance sheet. In this paper, an attempt at understanding the cost dynamics is made in order to assess the possible factors that that have bearing on it. The analysis has been done with an econometric approach to facilitate a better understanding of the dynamic relation that cost of funds has with other variables. For that, a set of panel data has been considered in which altogether six banks, three public sector banks and three private sector banks, are studied for better assessment of the results, data is drawn on quarterly basis for the time period 2005Q1-2023Q2 . On the given data set, Pooled OLS, Fixed and Random Effect Methods have been applied and the results have been compared using Hausman Test and the presence of time and individual effect has further been identified to evaluate the results obtained using different models. In order to assess the stability of the model, recursive CUSUM test has been used to draw a meaningful conclusion at the end of the process.

INTRODUCTION

Banking as an activity can traditionally be said as "accepting for the purpose of lending". In other words; banks accept deposits, pay interest on them while keeping certain portion of the same as reserve and then using the remaining portion to lend as loans, also banks charge interest on loans which is higher than the interest paid on deposit. But the workings of the banks have undergone major changes and a broader and encompassing definition has evolved out of it. The entire banking structure can be said to be a very vital organ of the economy. Banks have also been very important in the growth and development of the economy. Banking as an activity can be traced back to the time ever since human civilization moved from barter system to the currency system and people started accumulating wealth. In the entire history of the world, the first bank to be established was in Italy, even the word 'Bank' is derived from the Italian word 'Benco' which means Bench since Italians at that time used to carry out transactions sitting on a bench. In order to understand the evolution of banking from that point of time to what it is today we first need to understand the evolution of the currency system. Owing to the many demerits and shortcomings of the barter system, the need for a common currency was felt. And then even the currency changed forms and shapes many a times. Another factor that contributed to the flourishing of the banking system was the expansion and evolution of the economic activity. When trade among nations increased, the need for banking services also increased. It has taken years for the banks to have evolved and its activity to have diversified in such a way.

Understanding the intricacies of banking activities in respect to CAMEL approach and understanding the factors that have bearing on the cost of funds will only enable us to have a look at what are the factors that have significantly been contributing the cost being borne by banks. Banks in India have been undergoing major structural changes, their activities have diversified tremendously. And hence their cost, growing NPAs since last few years have been a clear indication that the banks need to re-evaluate their performance and understand its cost dynamics in order to be in the position to have control over them to a certain extent if not completely.

Since we know it well how important banking system is for the economy and its efficient and smooth functioning is very crucial for the economic growth and development. This study is being undertaken to assess the efficiency of the banking system using a varied range of statistical tools and techniques. The objectives for which the present study is being undertaken to assess and evaluate the performance of public as well as private sector banks. As is already discussed, commercial banks are divided into public sector banks and private sector banks. So considering the fact that both public as well as private sector banks have different goals and objectives despite the fact that both provide banking services but with different policy framework and institutional goals. So it is evident that their results using the same methodology will differ. At the same time, as it has been discussed prior that various regulatory and structural changes have taken place over time,

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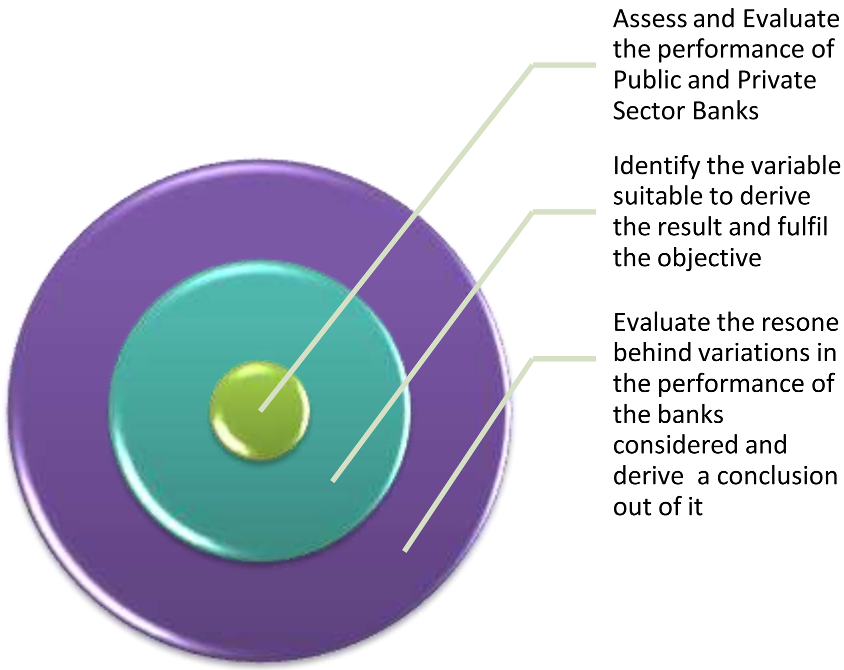
which have a crucial and a very significant impact on the performance of the banks. And to evaluate the reasons that behind the variations in the performance of public sector banks and private sector banks. There is always some scope of improvement and it by the end of the study we will better understand that why such variations are occurring. The results that is supposed to be obtained by the end of the study is supposed to answer questions like what are the factors that affects the performance of the banking the most? What discrepancy can be seen in the performance of the banks considered? Why such variations are occurring? Etc.

Figure 1: Objective of the study



Source: Author's own creation

In order to fulfill the objective of the study, we need to define the scope of the study. This requires sketching out a framework following which the study has to take place. This will require the selection of the banks that would represent all the banks. Selection of variable that will bring out the appropriate picture of the banks considered. The extent to which the results obtained can be generalized to the entire banking structure. In this study, altogether six banks have been considered, out of them three are private sector banks, while the other three are public sector banks. Namely Punjab National Bank, State Bank of India, Bank of Baroda, Axis Bank, ICICI Bank and Federal Bank. A comprehensive analysis of theses six banks using the Pooled OLS, Fixed Effect and Random Effect techniques is done further in the paper. While the results have been confirmed for their authenticity and applicability using the Hausman Test and the model's stability has been confirmed using the recursive CUSUM test.

REVIEW OF LITERATURE

Kumar and Sharma (2014) studied the financial performance of top eight best forming banks and has made use of econometric analysis to better evaluate the performances. A study constructed using CAMEL approach by G.L. Meena (2016), applying the Stratified Random Sampling technique the entire research has been planned and designed accordingly to explore the financial performance of the given banks. Object of the study included assessing the performance of all the public as well as private sector banks and difference in their performance respectively. Return on assets has been taken as the dependent variable, while profit per employee, debt-equity ratio, total advances-to-total deposits ratio, net NPA's-to-total advances ratio, capital adequacy ratio, business per employee, return on net worth, etc. And concluded profit per employee, debt equity ratio, total advances to total deposit ratio, net NPA to total advances ratio have been dominant factor that has affected the performance of the banks considered in the study. Dr. Sanjay Rastogi and Vishali Singh (2017) have made longitudinal study that is in continuation of their previous study; they used the same set of data and same set of variables to do the same. Their analysis included four best performing banks for the given timeframe from 2011-12 to 2014-15, two public and two private sector banks respectively namely State Bank of India, Punjab National Bank, HDFC Bank and Axis Bank. With the help of CAMEL ratios, the study goes on to conclude that HDFC Bank has maintained its first rank from their last study while Punjab National Bank and State Bank of India improved leaving Axis Bank behind. While B. Lavanya and T.

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Srinivas (2018) in their study emphasized on the financial growth of private sector banks and analyze their performance and efficiency. Using the Random sampling technique, the data has been collected for five private banks for the time frame of five years ranging from 2013-2017. And concluded that ICICI Bank performed better than the rest in terms of Capital adequacy ratio, management quality ratio and liquidity ratio while for HDFC and YES have better Asset Quality ratio than the rest. In their result, they gave ICICI top ranking followed by HDFC, Kotak Mahindra, Yes Bank and Axis Bank. A study by Deepak Kumar Raj (2022) aimed to assess the financial stability of the chosen banks which constituted of public as well as private sector banks namely; HDFC Bank, ICICI Bank, Axis Bank, State Bank of India, Bank of Baroda and Bank of India for the year 2018. The study sourced its data from various bulletins and statistics released by the Reserve Bank of India. The study, again using the CAMEL technique concluded that HDFC has performed better than the rest when it came to asset quality, management efficiency and earnings ability while its assets quality isn't as good as the rest. While Bank of India has been at the lowest in terms of Capital Aqeduacy, earnins Ability and Liquidity. Ramya and Ranjith (2023) have made a comparative study of financial performance of private and public sector banks and found private banks to be doing better than the public sector banks and have further suggested areas where public banks needs to improve. A similar econometric approach for measuring the financial performance of the Indian Commercial banks have been made by Lal and Gupta (2023) they too have constructed models to evaluate which are the key indicators of financial wellbeing of banks in India. And suggested for improvements in the required areas.

DATA AND METHODOLOGY

Data for this study has been collected from the Reserve Bank of India for all the six banks, the data collection is done considering the CAMEL Model, which is also the widely used method of data collection and overall analysis of banks.

The results are to be analyzed according to the given equation –

$$CoF_{it} = \beta_0 + \beta_1 RoE_{it} + \beta_2 StaffExp_{it} + \beta_3 ECI_{it} + \beta_4 CRAR_{it} + \varepsilon_{it}$$

Where;

Table 1 - Variables and their explanation

Variable	**Proxy or definition**	**Expected sign (as can be assessed with the results obtained)**
CoF	Cost of Funds	+/-
RoE	Return on equity	+/-
CRAR	Capital to risk Weighted Asset Ratio	+/-
StaffExp	Staff expenditure to total income	+/-
ECI	Efficiency Cost Income	+/-

Source: Author's own creation

The above mentioned equation will be analyzed respectively with the banks considered in the study. And the relationship among the variables varies from bank to bank.

RESULTS AND DISCUSSION

In order to analyze the impact of other vital variables on the cost of funds incurred by banks, the set of panel data was first analyzed using the Pooled OLS technique, but in order to understand the result well, the same was analyzed using the Fixed effect and Random effect techniques. Further in the process, time effect and individual effect in the results were analyzed and Hausman Test has been applied to understand which of the following results to go with.

Table 2: Pooled OLS

Pooled OLS Results				
Residuals:				
Min.	1st Qu.	Median	3rd Qu.	Max.
-2.598759	-0.674897	0.070336	0.786567	1.727717
Coefficients:				
	Estimate	Std. Error	t-value	Pr(>|t|)
(Intercept)	9.5063212	0.5990115	15.87	< 2.2e-16 ***
ROE	0.0235057	0.0071405	3.2919	0.001076 **
Staff Exp. To total income	-0.1903383	0.0159349	-11.9447	< 2.2e-16 ***
efficiency cost income`	0.0082472	0.0089167	0.9249	0.355516
CRAR standalone	-0.1251446	0.0228102	-5.4864	6.945e-08 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Total Sum of Squares: 592.99
Residual Sum of Squares: 419.99
R-Squared: 0.29174
Adj. R-Squared: 0.28529
F-statistic: 45.2078 on 4 and 439 DF, p-value: < 2.22e-16

Source: Author's own calculation

Table 3: Fixed Effect

Oneway (individual) effect Within Model (Fixed effect)				
Residuals:				
Min.	1st Qu.	Median	3rd Qu.	Max.
-2.29896	-0.69044	0.16231	0.69588	1.8888
Coefficients:				
	Estimate	Std. Error	t-value	Pr(>|t|)
ROE	0.0353491	0.0071106	4.9713	9.59e-07 ***
Staff Exp. To total income	-0.2926492	0.0244087	-11.9895	< 2.2e-16 ***
efficiency cost income`	0.0221886	0.0092375	2.402	0.016724 *
CRAR standalone	-0.0819551	0.0262989	-3.1163	0.001953 **
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Total Sum of Squares: 553.62				
Residual Sum of Squares: 381.67				
R-Squared: 0.31059				
Adj. R-Squared: 0.29629				
F-statistic: 48.8809 on 4 and 434 DF, p-value: < 2.22e-16				

Source: Author's own calculation

Table 4: Random Effect

Oneway (individual) effect Random Effect Model				
(Swamy-Arora's transformation)				
Residuals:				
Min.	1st Qu.	Median	3rd Qu.	Max.
-2.592249	-0.639873	0.065528	0.793941	1.724169
Coefficients:				
	Estimate	Std. Error	z-value	Pr(>|t|)
(Intercept)	9.5247552	0.6039097	15.7718	< 2.2e-16 ***
ROE	0.0262645	0.0071352	3.681	0.0002323 ***
Staff Exp. To total income	-0.2056562	0.0173235	-11.8715	< 2.2e-16 ***
efficiency cost income`	0.0107131	0.009016	1.1882	0.2347382
CRAR standalone	-0.1243052	0.0234087	-5.3102	1.095e-07 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

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Total Sum of Squares: 578.27
Residual Sum of Squares: 411.21
R-Squared: 0.28891
Adj. R-Squared: 0.28243
Chisq: 178.359 on 4 DF, p-value: < 2.22e-16

Effects:			
	var	std.dev	share
idiosyncratic	0.87943	0.937779	0.992
individual	0.007097	0.084244	0.008
theta: 0.2087			

Source: Author's own calculation

Table 5: Test for individual effect

F test for individual effects			
F = 8.7146	df1 = 5	df2 = 434	p-value = 6.888e-08
alternative hypothesis: significant effects			

Source: Author's own calculation

Table 6: Hausman Test

Hausman Test		
chisq = 34.577	df = 4	p-value = 5.675e-07
alternative hypothesis: one model is inconsistent		

Source: Author's own calculation

As can be seen from the given results, that it the Fixed effect which shows rather stable results. This shows that Staff expenditure to total income and CRAR impact the cost of funds negatively, while Return on equity and efficiency cost income has a positive relation with cost of funds. This can be taken as a trade-off where in more of funds being spent as staff expenditure and for the maintenance of CRAR will in turn reduce the availability of funds to finance other banking activities. Both CRAR and staff expenditure to total income are a crucial point to be considered while understanding and evaluating decisions related to Cost to be incurred on funds. Return on Equity and efficiency cost income should be given due importance owing to the direction they may seem to be following. Signifying in order to expect and anticipate better returns on equity and efficiency cost income more and more cost needs to be incurred. Now while making decisions so as to how to effectively manage cost of funds; one needs to understand unmindful reduction or even increasing the cost will not be beneficial. The way it reacts to other variables in the balance sheet of the banks is also a factor that needs due consideration. Now it is only with mindful use of funds at disposal that the financial positions of the banks of India can be improved. At the same time it is also important to adhere to the Basel Norms to ensure better health and financial wellbeing of the banks.

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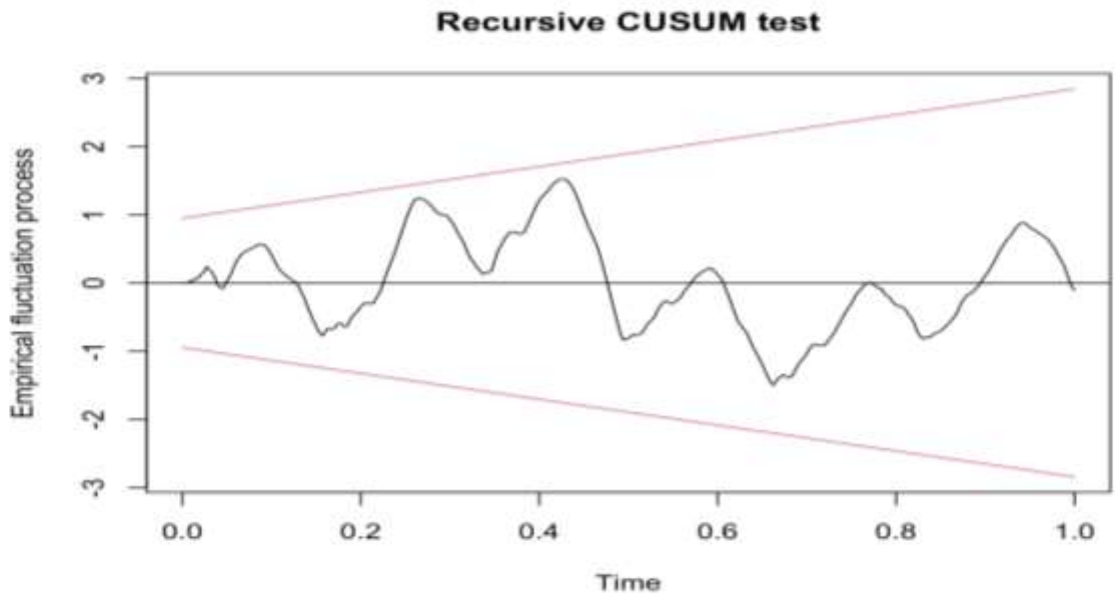
Figure 2: Recursive CUSUM Test



Source: Author's own calculation

The model's accuracy has been evaluated using recursive CUSUM Test and the model found to be stable to validate the results. Further the residuals for each of the six banks taken in this study have been evaluated to confirm the same.

CONCLUSION

The banking activity has diversified tremendously, and so has the cots outlets pertaining to such activities. This analysis has been done in order to assess what relation does Cost of Funds has with other factors that can potentially impact the cost of funds. For that we first need to know what does cost of funds mean when it comes to the business of any bank. Cost of funds is basically the cost that any bank has to incur in order to acquire the much of funds that it can lend to the public as loan. Making loans and advances constitute a very important function of the bank, if the cost of advancing short-term and long term-loans is low, then the borrowers will also have to pay low on their borrowings in the form of interest. So to understand an appropriate level of cost to be incurred on funds is a vital element in enhancing the performance of banks. This study made use of panel data set comprising of six banks; in which 3 banks were public and the rest three were private. As shown in the result, the cost of funds does get affected due to various other elements in bank's balance sheet. The intricate relation of cost of funds with other elements namely, return on equity, CRAR, staff expenses to income and efficiency cost income shows that enhanced return on equity will also demand more of cost of funds. When evaluating the financial performance of any bank its cost of funds forms to be a basis for understanding its level and scope of activity while return on equity, efficiency cost income, CRAR and Staff expenses to total income is another element that indicates how effectively the cost is being managed and what really should be the criteria to evaluate cost related decisions.

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