

FINANCIAL PERFORMANCE OF BANK – A TAXONOMIC APPROACH BASED ON CAMELS PARAMETER & ITS MAJOR DETERMINANT

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[This study utilized the 'CAMELS' parameter as identified by Narashimam Committee to judge the financial performance of selected 40 banks during the study period 2006 to 2018. Key parameters considered here to judge the financial performance of banks are Capital Adequacy Ratio (CAR), Non-performing Assets (NPA), Return on Assets (ROA), Return on Equity (ROE), Return on Investment (ROI), Cost of Deposits (COD), Net Interest Margin (NIM), Burden-asset ratio (BAR) and Credit-deposit Ratio (CDR). This paper has constructed a performance index of selected banks using Taxonomic approach. Constructed Financial performance index of these banks are regressed on following parameters, namely, bank size(Log assets), Interest income-loan ratio, Non-interest expenses-asset Ratio, equity-asset ratio to judge whether financial performance of banks depend on bank size, operating efficiency, non-banking performance and solvency of these banks. Results showed that capital adequacy ratio continued to be very high for foreign banks in comparison with private banks. CAR of public sector banks were usually in the lower side. Public Sector banks have more NPA and foreign banks have low level of NPA in India. This study inferred that desperate credit-mobilization drive may be detrimental for financial performance of banks. Panel regression estimate had inferred that financial performance of these banks has improved with the increase in size of banks as well as equity holding of these banks. Expenses other than interest had affected the financial performance adversely though interest incomes of these banks did not have any impact on performance of these banks.]

Keywords: Financial Performance, Commercial Banks' Profitability, Capital Adequacy Ratio, Non-performing Assets, CAMELS, Taxonomic Method, Panel Regression, Hausman Test, Lagrange Multiplier Test]

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Introduction

Banks are to function within certain parameters. These are basically institutional parameters consisting of banking principles and guidelines, economic policy parameters including the national priorities, if any, and the market parameters. Performance of commercial banks thus depends on how best a bank can efficiently manipulate its functional management so as to survive comfortably, earning sufficient profit inducing rapid development of Indian economy.

The Report of the Banking Commission (1972), after reviewing the functioning of the commercial banks in India in the post nationalization era, recommended on modernization of traditional operating methods, particularly regarding customer service, credit procedures and internal control systems. In an empirical study on rural branches, Varde presented some observations for improving the efficiency of rural branches that rural branches should be located at the central activity place that these should operate in groups of 4-5 sufficiently proximate branches etc. The Luther Committee studied Productivity, Efficiency and Profitability (PEP) and observed that the profitability of the banking system had come under severe pressure due to increased costs and comparatively lower earnings. Mathurs' study on the State Bank of India discussed about the massive branch expansion, particularly with rural orientation and introduction of the bank credit facility to the new fields of the priority sector in India. Bhatia empirically examined the profitability performance of the Indian

banking system during the period of 1950-68 taking the ratios of profit (before taxes) as a percentage of capital and assets. His study revealed that (a) profit performance of the Indian banking system had improved during the period, (b) levels of intermediation of various banking sectors in India varied significantly during 1950-68 while profitability did not exhibit any such difference. He proposed that there should not be direct regulation of the rate of return as much as the regulation of the asset portfolio of banks. Divatia and Venkatachalam developed composite indices of fifteen public sector banks. This analysis has observed that banks in the sample differed significantly in ranking positions in terms of productivity, profitability and social obligation criteria. In this study, factor analysis is used to develop the composite indices. Varde and Singh established that the profitability of an average bank declined from 13 percent in 1964 to 11 percent in 1974. A focus on developmental responsibility and profitability of banks is found in study by Kulkarni. Shah emphasized that profitability cannot improve merely by increasing the margin between borrowing and lending rates. He also located that the decline in the spread between interest earned and interest paid was caused by poor investment management, and inefficient staffing and working patterns, Ganesh highlighted upon profit plan, identification of profit centres and proper management information system for profitability monitoring. Markand made

inter-bank comparisons of the performance index of each public sector bank based on several qualitative indicators such as branch expansion, priority sector credit, deposit mobilization etc. Agarwal recommended more branch offices, particularly in rural areas, and greater credit facilities and maintenance of employment opportunities. Seshadri made a cross-section analysis to identify the determinants of profitability for the year 1976 taking the State Bank group, fourteen nationalized banks and some private sector banks. The analysis considered four measures of profitability such as profit as a percentage of (i) income, (ii) deposits, (iii) assets and (iv) working funds. The independent variables used in this study are the size of the firm, the proportion of liquid assets (cash reserves and call money) in total assets as a measure of liquidity, rural branches as a percentage of total branches, past profitability, percentage change in number of branches (to represent the growth factor), operating cost ratio, age of the firm, market share, proportion of fixed deposits to total deposits, proportion of priority sector advances to total advances and the ratio of officers and clerks to the total staff. The study identified percentage ratio of officers and clerks to the total staff and the percentage change in number of branches having a positive impact on bank profitability. Most importantly, this analysis identified the social factor such as priority sector advances as a percentage of total advances having a significant negative impact on profitability. It also concluded that

branch expansion may not act as a drain on profitability provided the banks can maintain the operating cost ratio and their market share. Zahir emphasized the concept of opportunity cost for determining the transfer price for branches. He was of the opinion of assigning necessary weightage to management objectives such as priority-sector lending, deposit mobilisation etc. along with profit objective. Varde and Singh made a financial statement analysis of fifteen banks for the year 1978 to make an interbank comparison of profitability. This analytical framework for profitability analysis established backward linkages for the interest earned related to volume of business, the total manpower expenses related to total manpower strength, volume of business related to total manpower strength, other expenses related to volume of business. In this paper they classified these banks into three separate banks, large, medium and small depending on the values of the variables and identified the cause of low profitability of these banks for the year 1978. In another paper, Varde and Singh studies several issues related to bank profitability such as profit management, productivity, profit planning, profit monitoring etc. Nayan emphasized that an Integrated Performance Index need to be developed on the basis of all important and quantifiable parameters of performance. He proposed a model for evaluation of performance of Commercial banks. Verghese made an in-depth study on profits and profitability of commercial banks during the 1970's and observed that although profitability increased

during 1970-76 (except 1972), it decelerated during 1977-79. He explored the major determinants profitability of Indian commercial banks during this period. In the Ninth Bank Economists' Conference in 1986, both exogenous and endogenous factors emerged as important determinants of profitability. The former included large pre-emptions of bank funds for liquidity requirements, administered interest rate structure with concessional rates on several categories of loans etc. The endogenous factors that emerged were increase in establishment expenditure, growing proportion of term deposits in the deposit mix era. Chopra emphasized on proper management of both costs as well as earnings for improving profitability. Rangarajan observed a declining trend in profitability of public sector banks which averaged 1.19 percent in 1989-90. According to Sadare bank profitability varied between as low as 0.19 to 0.21 percent during 1985-90. Amandeep found that profitability of all public sector banks (with the exception of three) declined over the period 1976-85).

Priya, K. & Velnampy, T. studied the relationship between organizational efficiency and profitability. This study aimed at finding out the impact of efficiency level on profitability of banks in Srilanka from 2008 to 2012. Results of this study inferred that sales to total assets are significantly correlated with Operating profit margin (OPM) and Return on Equity). This study also concluded that operating expenses to total assets and loan to total assets are

significantly correlated with Net Interest Margin.

It appears from the above that the pre-reform period, profitability of commercial banks was one of the major areas of research in which various issues of profitability have been considered. Since nationalization of banks in 1969 with priority sector lending as one of its most important agenda, a number of empirical researches are found to examine its impact on bank profitability. The most important result that emerges from all these is that profitability of commercial banks had been gradually eroding over the years. It stood at 13 percent in 1964 (Varde and Singh, 1974) declined to an extremely low of 0.19 to 0.21 percent during 1985-90 (Sadare, 1992)¹.

Makkar, A. and Singh, S. considered financial performance of a sample of 37 banks (22 public sector banks and 15 private sector banks) for the period from 2006-07 to 2010-11. CAMELS rating methodology was used in the study to measure the performance of the considered banks. This study established IDBI Bank to be the best performing bank followed by Kotak Mahindra Bank and ICICI Bank. Dhanalaxmi Bank had the worst performing one followed by J & K Bank and Karnataka Bank Ltd. The results of the 't' - testing this study, showed that there is a significant difference in the Capital Adequacy, Asset Quality and Earning Capacity of public and private sector banks in India, while there is no significant difference in the Management, Liquidity Position and Sensitivity to market risk of the two different banks

groups. The study accomplished that on an average, there is no statistically significant difference in the financial performance of the public and private sector banks in India, but still, there is a need for overall improvement in the public sector banks to make their position sturdy in the competitive market.

I have studied the financial performance of selected banks over the entire study period from 2006 to 2018 in the fourth chapter. Financial performance has been judged on parameters emphasized by the 'CAMELS' rating. Parameters taken in this study are Capital Adequacy ratio(CAR), Non-performing assets as a percentage of total assets(NPA), parameters like Return on Assets(ROA), Return on Equity(ROE), Return on Investment(ROI) and Cost of Deposits(COD) judging management of banks. I have studied the descriptive statistic of these variables like arithmetic mean and coefficient of variation along with their interrelationship assessed by correlation matrix among these variable. I have tried to construct a performance index using taxonomic method as a means of interbank comparisons of commercial banks in India.

1. Important objectives of the present study are to examine the financial performance of commercial banks.
2. To put forward some concrete suggestions and recommendations to make the performance of public sector banks and other commercial banks more competitive, efficient and prudent in catering banking service.
3. To extend the roadmap for prudent

banking system contributing to economic growth of our country in future.

Methodology and Data Source

I am giving the data source methodology here. Data is collected from "Statistical Tables Relating to Banks in India" obtained from RBI website www.rbi.org.in. I have taken 40 commercial banks for 13 years. My period of study is from 2006 to 2018. All 21 public sector banks, 12 private sector banks and 7 foreign banks are selected on the basis of availability of data over the entire period of study. Let us go through the chapter wise methodology.

Financial performance of banks depends on various aspects. In recent years, banking regulators emphasized on 'CAMELS' rating system to judge financial performance of banks. Keeping this in mind, this study focuses on finding out the descriptive statistics of variables relevant to 'CAMELS' rating. So, this study is going to judge the financial performance of banks based on the aspects highlighted by Basel Accord as well as Narasimham Committee in 'CAMELS' rating. The parameters considered here are Capital Adequacy Ratio (CAR), Non-performing Assets (NPA), Return on Assets (ROA), Return on Equity (ROE), Return on Investment (ROI), Cost of Deposits (COD), Net Interest Margin (NIM), Burden-asset ratio (BAR) and Credit-deposit Ratio (CDR).

The objectives of working out the performance index in this paper are to explore the Taxonomic² method as a means of interbank comparisons of

commercial banks in India during the study period. The index of performance is based on the parameters whose descriptive statistics has been discussed earlier. The index, basically, estimates the performance of each bank with respect to each of its parameters by considering its distance from the ideal value to facilitate interbank comparisons. Here the ideal is defined as the best value among the 40 commercial banks considered in the study. This means that for NPA, for example, the lowest value is the best value where as for profitability such as ROA, ROI, CAR, ROE and NIM are the best value is the highest value. For credit-deposit ratio, highest value is the best value but for cost of deposits and burden-asset ratio (BAR), best value is the lowest value. Several units together, then, simulate the 'ideal unit' or, the 'ideal bank' holding all the ideal values in the set. In the next step, a pattern of performance P_{io} which is simply the distance of each unit in the matrix to the 'ideal unit' is computed as follows:

$$P_{io} = \sqrt{\sum_{k=1}^M (D_{ik} - D_{ok})^2}$$

Where $i=1, 2, \dots, N$, N being the number of banks and M the number of characteristics. Here, 'o' is the maximum or, minimum standardised value for the ideal and D_{ik} is the standardised value for the i -th unit and k -th variable. The larger the value of P_{io} the greater will be the distance of the i -th unit from the ideal point within the group. In the final step, an index of measure of performance M_i

is derived as follows:

$$M_i = P_{io}/P_o$$

Where $P_o = \text{Mean } P_o + 3 \times \text{SD } P_o$

$$\text{Mean } P_o = 1/N \sum_{i=1}^N P_{io}$$

$$\text{SD } P_o = 1/N \left[\sum_{i=1}^N (P_{io} - \text{Mean } P_o)^2 \right]^{1/2}$$

Regression Results of FPI on bank size(Log assets), Interest income-loan ratio, Non-interest expenses-asset Ratio, equity-asset ratio. Shows dependency of performance of these banks on bank size, interest income, non-interest expenses and capital base of these banks. Performance Index calculated on the basis of above principle is regressed on bank size(proxied by logarithm of asset, interest income-loan ratio, non-interest expenses-asset ratio and equity asset ratio. Interest income-loan ratio shows the dependence of performance of these banks on interest part of bank's income and non-interest expenses-asset ratio shows dependence of banks on non-interest part of banks' expenses. Equity assets ratio shows the solvency of banks whether capital base of these banks affect performance of these banks.

This is a panel regression model examining the appropriate model with the help of Lagrange Multiplier test for random effects as well as Hausman test to find out whether fixed or, GLS random effect. Here, Stata package is used to find out the results where we prefer CLRM and apply ordinary least square (OLS) method when both Restricted F-test and

LM-test are insignificant. We choose REM and apply generalized least square (GLS) method when Restricted F-test is insignificant and LM test is significant. In case both Restricted F-test and LM test are significant, then we shall apply REM if Hausman test is insignificant. We choose fixed effect model when LM-test is insignificant but restricted F-test is significant. In case both Restricted F-test and LM test are significant, then we shall apply FEM if Hausman test is significant.

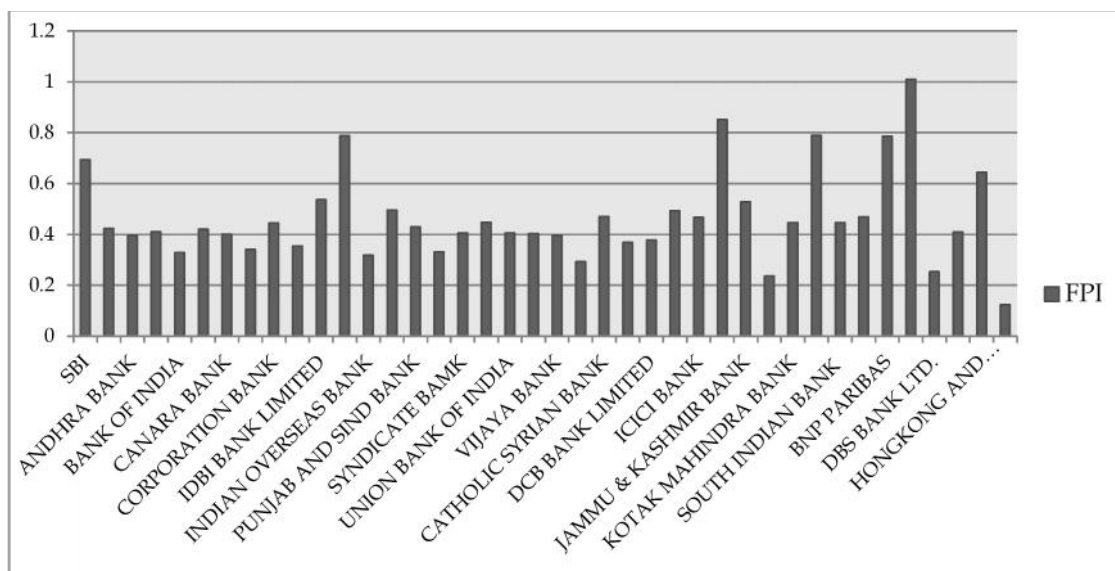
Empirical analysis

Financial performance is defined as the ability of a bank to utilize its resources to generate revenues from its business. This can be used to assess the overall financial health of a business unit. Banks are the

business units which accept monetary resources from public and channelize the funds for productive purpose thereby generating revenues. Financial performance of banks depends on various aspects. In recent years, banking regulators emphasized on ‘CAMELS’ rating system to judge financial performance of banks. Keeping this in mind, this study focuses on finding out the descriptive statistics of variables relevant to ‘CAMELS’ rating.

Let us discuss the performance index constructed on the basis of financial performance parameter of banks with the help of Taxonomic method. This will facilitate interbank comparison on the basis of performance index constructed.

Chart 4.10 Bank wise FPI on average financial performance based on ‘CAMELS’



Analysis shows that City Bank (1.009) secures the lowest slot in terms of financial performance index on an average over the entire period. INDUSIND secures the second position (0.851686) from below. LAKSHMI VILAS BANK secures third position from below with FPI 0.788985. BNP Paribus (0.785389), Indian Bank (0.788338), State Bank of India (0.693802)

and HONGKONG AND SHANGHAI BANKING CORPN LTD.(0.644667) has been placed just over these banks mentioned above. This shows that except SBI, Indian Bank is performing consistently poor among public sector banks during this period based on 'CAMELS' indicator.

Banks	PI
STANDARD CHARTERED BANK	0.123569
KARUR VYSYA BANK	0.235955
DBS BANK LTD.	0.253321
AXIS BANK	0.292798
INDIAN OVERSEAS BANK	0.317516
BANK OF INDIA	0.328986
PUNJAB NATIONAL BANK	0.330741
CENTRAL BANK OF INDIA	0.34124
DENA BANK	0.353831
CITY UNION BANK LIMITED	0.368012
DCB BANK LIMITED	0.378173
VIJAYA BANK	0.395489
ANDHRA BANK	0.39594
CANARA BANK	0.400563
UNITED BANK OF INDIA	0.403726
SYNDICATE BANK	0.405251
UNION BANK OF INDIA	0.405631
DEUTSCHE BANK AG	0.409706
BANK OF BARODA	0.410709
BANK OF MAHARASHTRA	0.419525
ALLAHABAD BANK	0.42422

Banks	PI
PUNJAB AND SIND BANK	0.430196
CORPORATION BANK	0.445628
SOUTH INDIAN BANK	0.44625
KOTAK MAHINDRA BANK	0.446323
UCO BANK	0.447749
ICICI BANK	0.467209
BANK OF AMERICA N.A	0.469201
CATHOLIC SYRIAN BANK	0.470257
HDFC BANK	0.492925
ORIENTAL BANK OF COMMERCE	0.49614
JAMMU & KASHMIR BANK	0.527859
IDBI BANK LIMITED	0.536756
HONGKONG AND SHANGHAI BANKING CORPN LTD.	0.644667
SBI	0.693802
BNP PARIBAS	0.785389
INDIAN BANK	0.788338
LAKSHMI VILAS BANK	0.788985
INDUSIND BANK	0.851686
CITIBANK N.A.	1.009008

Standard Chartered Bank topped the chart of financial performance index with value 0.123569. Study of components reveal that except Return on Equity, this bank has performed among the best in all other 'CAMELS' rating. Karur Vysya (0.235955), DBS (0.253321) and Axis (0.292798) have been placed just below Standard Chartered in average performance index over the study period.

Interestingly, four public sector banks have secured fifth to eight place, namely, Indian Overseas, Bank of India, Punjab National Bank and Central bank of India. Credit-deposit ratio of these top performing foreign banks is lower comparatively than all other banks studied here. Return on equity of two top performing foreign banks is low. In all other aspects of financial performance, all

these banks ranked 2nd to 4th have performed brilliantly. In case of top performing public sector banks also, show that except credit-deposit ratio, financial performance in all other aspects is better.

Year wise performance index of the commercial banks is presented in Appendix 4.4. In the year 2006,Allahabad bank has topped with an index value 0.183518 followed by Andhra Bank (0.20585),Axis Bank(0.20669) and IndianBank (0.22056).The worst performing bank is IDBI Bank Limited with index value 1.377536 preceded by Bank of America N.A.,DCB Bank Limited, BNP Paribas and Kotak Mahindra Bank positioning 39th ,38th ,37th and 36th.respectively by rank order .The coefficient of variation of the index value is 68.06511 showing high variability in the relative performance. The most notable observation from the performance index evaluation is that the top most four banks in rank order are all among the category of public sector banks.

In 2007, DBS Bank Ltd gained the first position (0.204592) from 12th rank (0.23844) in the previous year in spite of decline in its performance index. The observation along with range of performance index (1.209314 - 0.204592) =1.004722 and the coefficient of variation 33.96873 prove that variability in performance has decreased in this year comparing to the previous year.

After DBS Bank Ltd, four other banks coming next are Indian Bank (0.35592), Punjab and Sind Bank (0.37166) improving its position from 4th position

in 2006 to 3rd position in 2007, United Bank of India (0.38286) its position to 4th in 2007 from 9th position in 2006 but Axis Bank (0.38286) falls from position 3rd to 5th. The lowest ranked bank is IDBI Bank Limited (1.20931) in terms of performance index value which is the same as in 2006 .IDBI Bank Limited is preceded by BNP PARIBAS(0.88048), DCB Bank Limited 0.70789), KOTAK MAHINDRA Bank (0.75097) and STANDARD CHARTERED BANK (0.62265) .Performance index for this year shows that a radical transformation has occurred in ranking of these banks. BNP PARIBAS became the worst performing bank in 2008 (1.09623), 2009 (1.00486), 2011 (1.069531), 2012 (0.970064) and 2013 (1.291831) in terms of the value of performance index. HDFC Bank became the top ranked bank in 2008(0.31192) where as DBS Bank Ltd(0.10888) reached the first position in terms of performance in 2009 as in 2007.HSBC Bank Limited maintained its first position in 2010,2011,2014 and 2015 ,JAMMU & KASHMIR reached the top rank in 2012 and 2013 where as CITI BANK N.A. secured the first position in 2017 and 2018. So from the above analysis I can conclude that BNP PARIBAS performed very worst where as DBS BANK LIMITED, HSBC BANK, JAMMU & KASHMIR BANK and CITI BANK N.A. performed very well in my study period 2006 to 2018.

Regression Results of FPI on bank size(Log assets, Interest income-loan ratio, Non-interest expenses-asset Ratio, equity-asset ratio are shown:

Fixed-effects (within) regression
 Group variable: Bank

Number of obs = 520

Number of groups = 40

corr(u_i, Xb) = -0.4778
 F(4,476) = 9.89
 Prob > F = 0.0000

FPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
LnAssets		.0551991	.0104341	5.29	0.000	.0346966 .0757016
Intincomeloansratio		.0004378	.0003111	-1.41	0.160	-.0010491 .0001735
Noninterestexpensesassetsrati		-.0140574	.0067784	2.07	0.039	.0007381 .0273768
equityassetsratio		.1365272	.0352327	3.88	0.000	.0672963 .205758
_cons		-.3311659	.1490891	-2.22	0.027	-.62412 -.0382118
sigma_u	.14286347					
sigma_e	.13866374					
rho	.51491437 (fraction of variance due to u_i)					

F test that all u_i=0: F(39, 476) = 9.64 Prob > F = 0.0000

Random effect results

Random-effects GLS regression
 Number of obs = 520

Group variable: Bank
 Number of groups = 40

R-sq: Obs per group:

within = 0.31 min = 13

between = 0.0532 avg = 13.0

overall = 0.253 max = 13

Wald chi2(4) = 28.56

corr(u_i, X) = 0 (assumed) Prob > chi2 = 0.0000

FPI	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
LnAssets		.0316376	.0086887	3.64	0.000	.014608 .0486673
Intincomeloansratio		.0003953	.0003149	-1.26	0.209	-.0010125 .0002218
Noninterestexpensesassetsrati		-.013242	.0067009	1.98	0.048	.0001086 .0263755
equityassetsratio		.1136647	.03187	3.57	0.000	.0512007 .1761287
_cons		-.0006455	.1250819	-0.01	0.996	-.2458016 .2445106

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sigma_u | .10208417
sigma_e | .13866374
rho | .35148723 (fraction of variance due to u_i)

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-- Coefficients --

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	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
LnAssets	.0551991	.0316376	.0235614	.0057771
Intincomel~o	.0004378	.0003953	.0000425	
Noninteres~i	-.0140574	-.013242	-.0008154	.0010224
equityasse~o	.1365272	.1136647	.0228625	.0150216

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b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

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Test: Ho: difference in coefficients not systematic

$$\chi^2(4) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 280.42$$

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

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. xttest0

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Breusch and Pagan Lagrangian multiplier test for random effects

$$FPI[Bank,t] = Xb + u[Bank] + e[Bank,t]$$

Estimated results:

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| Var sd = sqrt(Var)
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FPI	.0335709	.1832238
e	.0192276	.1386637
u	.0104212	.1020842

Test: $\text{Var}(u) = 0$
 $\text{chibar2}(01) = 372.70$
 $\text{Prob} > \text{chibar2} = 0.0000$

As Breusch and Pagan Lagrangian multiplier test for random effects and Hausman tests are significant, this model is fixed effect model. Overall coefficient of determination is 31.64 which is good considering such a small number of variables. Results show that interest income-loan ratio is insignificant in the study period indicating that performance of these banks does not depend on interest income-loan ratio. All other variables are significant at 5% level with Log assets having co-efficient .0551991, non-interest expenses-asset ratio having coefficient -.0140574, equity-asset ratio with estimated co-efficient .1365272. This means that performance of these banks in terms of our calculated performance index will improve slightly along with increase in bank size and equity holding of these banks. Increment in non-interest expenses result in decline in performance of these banks within this study period. Performance index calculated using the taxonomic methodology shows that interest income-loan ratio does not affect performance index significantly.

Conclusion

Interestingly, coefficient of variation by individual banks suggests that more or less capital adequacy ratio of public sector banks remains stable over the period in

comparison with foreign and private banks. Capital adequacy ratio continues to be very high for foreign banks in comparison with private banks. CAR of public sector banks are usually in the lower side. Public Sector banks have more NPA and foreign banks have low level of NPA in India. As public sector banks in India are the major player in Indian money market. Time series average of ROE shows gradual decline in recent years. HDFC (17.367) has maximum average ROE over the entire period. Average ROE of all banks over time shows gradual decline in recent years. HDFC (17.367) has highest average ROE over the entire period. ROE is decreasing gradually like ROA as well as NPA. Average ROE is minimum for IDBI (1.317). Return on investment stays more consistent than other two management parameters ROA and ROE mentioned earlier. Coefficient of variation of average ROI of all banks over the entire time period is very low 11.4454. Similarly, coefficient of variation for ROE, ROA and COD are 141.68, 38.98 and 19.97. So, return on equity is the most volatile component of management during this period. This is quite expected because we know that capital market is more volatile than money market and this return ROE is intensely linked with capital market.

Cross section analysis of ROI suggests that except IDBI with a substantial low average value, other banks have more or less in the same range between 6 to 9. Most of the banks have ROI between 7 to 8. One of the foreign banks called DBS have the highest average ROI over the entire time period with value 8.6724. Time series study of ROI shows that it reaches the low in the year 2010 and has recovered after that with a steady value for last few years. Few private banks are suffering from higher cost of deposit than public sector banks. This shows that these private banks are offering more interest on deposits than their government counterpart. Foreign banks, on the other hand, have low COD indicating good managerial efficiency over the time period. Study of earning parameter shows those commercial banks in India on an average has more burden than spread.

According to our study, earning, capital adequacy and management parameters like ROA, NIM, CAR, ROE and COD are interlinked. Study of financial performance hints at top performers usually mobilizes less credit from their deposits relatively. This means that desperate credit-mobilization drive may be detrimental for financial performance of banks.

Foreign banks topped the list in terms of performance in this overall study period. Standard Chartered led all the banks in terms of performance index. Among the private sector banks, Axis banks performed as number one and in aggregate number 4. Indian Overseas,

Bank of India, PNB and Central Bank of India have secured fifth to eighth place in terms of performance index. This shows that despite social obligations, public sector banks in India can compete with even foreign as well as private sector banks if their functioning remains efficient. Credit-deposit ratio of top performing banks is low compared less performing banks. This indicates that greater deposit mobilization may hinder banks' performance in India in the post-reform period. The most noteworthy study from the performance index assessment is that the top most four banks in rank are all among the category of public sector banks. Study of performance index reveals that performance index of foreign banks except HSBC, DBS and CITI bank, have deteriorated since 2008 due to international banking crisis whereas public sector banks have been least affected in terms of performance in this period.

Coefficient of variation was highest in 2006 followed by in 2013 with more than 0.50 otherwise it was moderate throughout the study period. We have identified the best performing banks marking bold and worst performer marking *. Study shows that more or, less foreign banks have performed best year wise except in 2006, Allahabad bank among public, HDFC among private in 2008 along with J & K bank from 2011 to 2013. IDBI started as worst performing bank for the year 2006 and 2007. Except in 2010 ICICI, BNP Paribus, one of the foreign banks has performed worst from 2008 to 2013. Again in 2015 and 2016,

ICICI has declined to last position. In 2014, deutsche Bank has fallen to last position and in 2018; Indian Overseas Bank has performed worst. Astonishingly, in 2017, one of the best performer Jammu and Kashmir Bank has fallen to worst position.

Panel regression estimate has inferred that financial performance of these banks has improved with the increase in size of banks as well as equity holding of these banks. Expenses other than interest have

affected the financial performance adversely though interest income of these banks do not have any impact on performance of these banks. Over the period, IDBI has improved its performance from worst to mediocre. Other than IDBI, DCB, HSBC, Bank of America, CITI Bank and BNP Paribus have improved their financial performance over the year. Most of the public sector banks have worsened their performance during this study period.

Appendix Table1

Banks(FPI)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SBI	0.24464 6	0.48858 6	0.4776 88	0.4651 08	0.6218 53	0.4454 37	0.4631 7	0.3908 6	0.5177 45	0.5299 29	0.5062 19	0.7791 12	0.40043 2
ALLAHABA D BANK	0.18351 8	0.44533 1	0.3938 33	0.4198 95	0.4943 44	0.3546 93	0.2884 58	0.3254 08	0.4136 73	0.4849 27	0.5999 83	0.5645 26	0.75711
ANDHRA BANK	0.20585 2	0.43245 5	0.4021 08	0.4663 32	0.5581 01	0.4358 74	0.4309 02	0.3591 61	0.4420 98	0.5743 99	0.4906 69	0.4697 51	0.67560 5
BANK OF BARODA	0.23634 3	0.44513 5	0.4293 75	0.4643 82	0.5656 72	0.3941 1	0.3470 32	0.2274 35	0.3226 37	0.3265 76	0.6070 12	0.3708 26	0.42786 2
BANK OF INDIA	0.26749 4	0.45861 2	0.4670 42	0.4700 14	0.6287 33	0.3741 39	0.4636 02	0.3409 22	0.4774 16	0.4526 86	0.7174 96	0.5078 81	0.50687 5
BANK OF MAHARASH TRA	0.29851 8	0.4365	0.4142 64	0.3604 78	0.4558 27	0.3983 47	0.4327 51	0.3746 26	0.4506 69	0.5611 31	0.5514 48	0.6774 12	0.44963
CANARA BANK	0.23995 3	0.44565 3	0.4211 61	0.4617 48	0.5635 28	0.3514 01	0.3438 78	0.2673 21	0.3648 7	0.3878 76	0.5750 12	0.4371 33	0.48965 3
CENTRAL BANK OF INDIA	0.26304 3	0.41047 8	0.4244 7	0.4085 42	0.4897 55	0.4053 71	0.5319 87	0.3959 39	0.4471 56	0.6501 55	0.5736 36	0.5396 62	0.60619
CORPORATI ON BANK	0.27143 4	0.46563 6	0.4167 24	0.3428 1	0.4896 9	0.3912 26	0.3556 99	0.2580 92	0.3874 32	0.4540 92	0.5365 46	0.3813 95	0.69938 8
DENA BANK	0.28184	0.43285 2	0.3676 82	0.3652 82	0.5176 77	0.3342 95	0.3538 62	0.2324 06	0.4082 59	0.3708 61	0.6383 11	0.5696 28	0.55469 6
IDBI BANK LIMITED	1.37753 6*	1.20931 4*	1.0607 5	0.7573 96	0.7974 18	0.6050 48	0.5961 55	0.4951 23	0.5814 01	0.5548 29	0.7358 68	0.7478 82	0.76189 4
INDIAN BANK	0.22056 2	0.35592 1	0.3208 52	0.4093 19	0.5404 83	0.3497 86	0.3768 01	0.3008 32	0.4211 06	0.4351 51	0.4520 93	0.4048 92	0.36808 8
INDIAN OVERSEAS BANK	0.223	0.42113 5	0.4093 67	0.4664 83	0.6180 27	0.4609 61	0.5090 7	0.4593 88	0.5723 24	0.4460 02	0.7449 25	0.7535 14	0.83458 9*
OBC	0.26088 4	0.46722 9	0.5042 09	0.4320 11	0.5582 26	0.3367 55	0.4219 58	0.3284 62	0.42	0.4065 03	0.4906 19	0.5847 6	0.8194
PUNJAB AND SIND BANK	0.21793 2	0.37166 5	0.4499 7	0.4140 9	0.4722 33	0.3713 07	0.4203 12	0.3575 22	0.3964 83	0.4655 85	0.4450 23	0.4403 46	0.44416 1
PUNJAB NATIONAL BANK	0.22229 8	0.45064 9	0.4284 44	0.4463 94	0.6021 52	0.4400 97	0.4078 9	0.3453 06	0.4448 08	0.4529 16	0.6412 79	0.4279 28	0.65281 7
SYNDICATE BANK	0.23421 8	0.40791 4	0.3617 47	0.4127 43	0.6791 52	0.4722 08	0.4454 15	0.3343 23	0.4952 11	0.4687 17	0.6828 39	0.5380 7	0.61539 1

Financial Performance of Bank – A Taxonomic Approach

Banks(FPI)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
UCO BANK	0.29103 2	0.49677	0.42393 6	0.40829 3	0.48720 2	0.33669 6	0.41947 1	0.37115 9	0.39994 4	0.31005 1	0.75258 4	0.57702 8	0.65381 3
UNION BANK OF INDIA	0.27213 4	0.48300 3	0.41208 8	0.39317 5	0.53427 3	0.40752 4	0.49705 8	0.36751 4	0.43834 2	0.52849	0.52629 8	0.53262 3	0.57133 7
UNITED BANK OF INDIA	0.22796 8	0.38285 9	0.33477 8	0.42970 2	0.49835 2	0.36506 5	0.37803 1	0.33702 8	0.31975 7	0.80082 8	0.50743 7	0.31917 3	0.49368 5
VIJAYA BANK	0.26173 3	0.40599 6	0.37525 1	0.40785 5	0.51564 2	0.32898 3	0.37630 3	0.31963 6	0.30772 7	0.39660 4	0.43907	0.41861 3	0.34852 2

Banks(FPI)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AXIS BANK	0.206 686	0.383 474	0.3782 95	0.3948 86	0.590 16	0.4109 04	0.3940 01	0.2999 05	0.468 603	0.5711 87	0.6770 93	0.693 667	0.632 908
CATHOLIC SYRIAN BANK	0.305 979	0.445 341	0.3544 48	0.3305 18	0.638 877	0.4921 32	0.5053	0.3849 22	0.504 387	0.4161 86	0.1646 44	0.339 036	0.416 25
CITY UNION BANK LIMITED	0.256 795	0.451 644	0.4019 16	0.3918 47	0.476 908	0.3594 39	0.3508 05	0.2650 55	0.317 415	0.3677 98	0.7408 17	0.506 607	0.449 962
DCB BANK LIMITED	0.707 889	0.444 376	0.4509 73	0.7189 77	0.899 175	0.5276 7	0.5950 5	0.3776 23	0.423 686	0.5238 95	0.5627 91	0.567 083	0.458 918
HDFC BANK	0.221 427	0.433 526	0.3119 2	0.3956 42	0.623 25	0.4291 6	0.4262 7	0.3365 84	0.469 658	0.4615 59	0.5826 63	0.611 973	0.433 021
ICICI BANK	0.381 808	0.610 138	0.7506 56	0.8668 82	0.916 73*	0.7418 11	0.8222 85	0.6492 51	0.819 516	0.9180 81*	0.8064 39*	0.754 078	0.546 957
INDUSIND BANK	0.298 168	0.436 214	0.4790 03	0.4799 35	0.657 432	0.4211 12	0.5060 69	0.3749 74	0.630 517	0.6737 38	0.6870 26	0.661 918	0.580 502
JAMMU & KASHMIR BANK	0.241 55	0.439 289	0.3624 98	0.3251 24	0.399 813	0.1910 57	0.1731 1	0.1240 75	0.293 255	0.2585 22	0.3669 03	0.791 82*	0.351 159
KARUR VYSYA BANK	0.259 714	0.499 502	0.4763 34	0.3892 74	0.521 135	0.3576 05	0.3553 67	0.2888 64	0.416 441	0.4990 89	0.4849 97	0.476 666	0.408 124
KOTAK MAHINDRA BANK	0.452 875	0.750 968	0.7847 04	0.9576 19	0.840 019	0.7906 55	0.8433 46	0.5766 3	0.606 967	0.6042 15	0.5760 66	0.618 149	0.490 867
LAKSHMI VILAS BANK	0.291 708	0.520 268	0.4883 28	0.4744 53	0.637 886	0.4103 53	0.4081 12	0.3646 77	0.320 391	0.4814 22	0.4410 2	0.505 612	0.661 297
SOUTH INDIAN BANK	0.267 772	0.419 408	0.4035 84	0.3577 51	0.524 91	0.3286 05	0.3637 23	0.2294 56	0.422 576	0.3504 48	0.4096 8	0.405 443	0.375 434
BANK OF AMERICA N.A.	0.985 365	0.827 364	0.5870 31*	0.5676 48	0.504 744	0.7639 64	0.8882 38	0.7192 74	0.883 292	0.7365 4	0.6851 71	0.394 057	0.404 882
BNP PARIBAS	0.509 489	0.880 48	1.0962 31*	1.0048 63*	0.648 121	1.0695 31*	0.9700 64*	1.2918 31*	0.808 592	0.8192 92	0.6560 23	0.498 53	0.392 426
CITIBANK N.A.	0.371 837	0.619 765	0.5775 32	0.4965 99	0.572 17	0.3957 98	0.3734 66	0.3101 56	0.288 506	0.2672 2	0.2429 22	0.094 443	0.044 93
DBS BANK LTD.	0.238 435	0.204 592	0.3352 32	0.1088 8	0.370 25	0.8491 93	0.8086 75	0.5282 33	0.722 85	0.7661 4	0.4797 27	0.598 428	0.400 126
DEUTSCHE BANK AG	0.239 093	0.479 686	0.3721 72	0.3542 98	0.875 906	0.7583 78	0.3853 32	0.7761 07	0.977 88*	0.7161 56	0.7574 43	0.689 184	0.442 856
HSBC	0.262 321	0.428 796	0.4229 11	0.2512 64	0.351 074	0.1928 33	0.2216 48	0.1867 99	0.181 655	0.2319 33	0.2752 48	0.134 686	0.127 027
STANDARD CHARTERED BANK	0.348 6	0.622 655	0.6823 78	0.6827 17	0.808 995	0.5503 64	0.6091 31	0.6455 49	0.699 714	0.7285 79	0.6407 35	0.618 168	0.373 913
Worst	1.377 536	1.209 314	1.0962 31	1.0048 63	0.916 73	1.0695 31	0.9700 64	1.2918 31	0.977 88	0.9180 81	0.8064 39	0.791 82	0.834 589
Best	0.183 518	0.204 592	0.3119 2	0.1088 8	0.351 074	0.1910 57	0.1731 1	0.1240 75	0.181 655	0.2319 33	0.1646 44	0.094 443	0.044 93
Av	0.328 736	0.495 279	0.4752 99	0.4687 81	0.588 647	0.4599 97	0.4714 95	0.3979 61	0.482 124	0.5112 58	0.5612 94	0.525 043	0.503 067
STDV	0.223 755	0.168 24	0.1749	0.1770 73	0.137 118	0.1800 01	0.1761 68	0.2006 8	0.172 625	0.1629 14	0.1462 35	0.158 319	0.165 644
COV	68.06 511	33.96 873	36.797 98	37.773 11	23.29 366	39.130 88	37.363 79	50.427 03	35.80 517	31.865 35	26.053 21	30.15 358	32.92 683

APPENDIX Table 2 FPI Ranking for entire period

Banks	PI
STANDARD CHARTERED BANK	0.123568975
KARUR VYSYA BANK	0.235955345
DBS BANK LTD.	0.253320721
AXIS BANK	0.292798285
INDIAN OVERSEAS BANK	0.317515973
BANK OF INDIA	0.328986467
PUNJAB NATIONAL BANK	0.33074098
CENTRAL BANK OF INDIA	0.341240153
DENA BANK	0.353831418
CITY UNION BANK LIMITED	0.368012216
DCB BANK LIMITED	0.378173149
VIJAYA BANK	0.395489431
ANDHRA BANK	0.39593954
CANARA BANK	0.400563436
UNITED BANK OF INDIA	0.403725976
SYNDICATE BANK	0.405251471
UNION BANK OF INDIA	0.405631106
DEUTSCHE BANK AG	0.409706268
BANK OF BARODA	0.410709156
BANK OF MAHARASHTRA	0.419525093
ALLAHABAD BANK	0.424220117
PUNJAB AND SIND BANK	0.430195661
CORPORATION BANK	0.445627931
SOUTH INDIAN BANK	0.446250408
KOTAK MAHINDRA BANK	0.446322594
UCO BANK	0.447748991
ICICI BANK	0.467208752
BANK OF AMERICA N.A	0.469201113
CATHOLIC SYRIAN BANK	0.470257348
HDFC BANK	0.492924643
ORIENTAL BANK OF COMMERCE	0.496139774
JAMMU & KASHMIR BANK	0.527858789

Banks	PI
IDBI BANK LIMITED	0.536755967
HONGKONG AND SHANGHAI BANKING CORPN LTD.	0.644666691
SBI	0.693802006
BNP PARIBAS	0.785388583
INDIAN BANK	0.788338495
LAKSHMI VILAS BANK	0.788985346
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Appendix Table 3: List of best and worst performers in each year

2006		2013	
IDBI BANK LIMITED (worst)	1.377536	BNP Paribas(worst)	1.291831
Allahabad BANK(best)	0.183518	JAMMU & KASHMIR BANK(best)	0.124075
2007		2014	
IDBI BANK LIMITED(worst)	1.209314	DEUTSCHE BANK AG(worst)	0.97788
DBS Bank Ltd. (best)	0.204592	HONGKONG AND SHANGHAI BANKING CORPN LTD.(best)	0.181655
2008		2015	
BNP Paribas(worst)	1.096231	ICICI Bank(worst)	0.918081
HDFC(best)	0.31192	HONGKONG AND SHANGHAI BANKING CORPN LTD.(best)	0.231933
2009		2016	
BNP Paribas(worst)	1.004863	ICICI Bank(worst)	0.806439
DBS Bank Ltd. (best)	0.10888	CATHOLIC SYRIAN BANK(best)	0.164644
2010		2017	
ICICI Bank(worst)	0.91673	JAMMU & KASHMIR BANK(worst)	0.79182
HONGKONG AND SHANGHAI BANKING CORPN LTD.(best)	0.351074	CITIBANK N.A.(best)	0.094443
2011		2018	
BNP Paribas(worst)	1.069531	INDIAN OVERSEAS BANK(worst)	0.834589
HONGKONG AND SHANGHAI BANKING CORPN LTD.(best)	0.191057	CITIBANK N.A.(best)	0.04493
2012			
BNP Paribas(worst)	0.970064		
JAMMU & KASHMIR BANK(best)	0.17311		

Appendix Table 4: Mean, COV, Worst, Best & Range year wise

FPI	Av	COV	MAX(worst)	Min(best)	Range
2006	0.329	68.07	1.37753557	0.18351809	1.19401748
2007	0.495	33.97	1.20931369	0.2045921	1.00472159
2008	0.475	36.8	1.09623126	0.31192043	0.78431083
2009	0.469	37.77	1.00486306	0.10888012	0.89598294
2010	0.589	23.29	0.91673017	0.35107403	0.56565614
2011	0.46	39.13	1.06953071	0.19105651	0.8784742
2012	0.471	37.36	0.97006358	0.17310995	0.79695363
2013	0.398	50.43	1.291831	0.12407546	1.16775554
2014	0.482	35.81	0.97788006	0.18165494	0.79622512
2015	0.511	31.87	0.91808091	0.23193251	0.68614839
2016	0.561	26.05	0.80643943	0.16464362	0.6417958
2017	0.525	30.15	0.79181981	0.09444269	0.69737713
2018	0.503	32.93	0.83458869	0.04492994	0.78965876

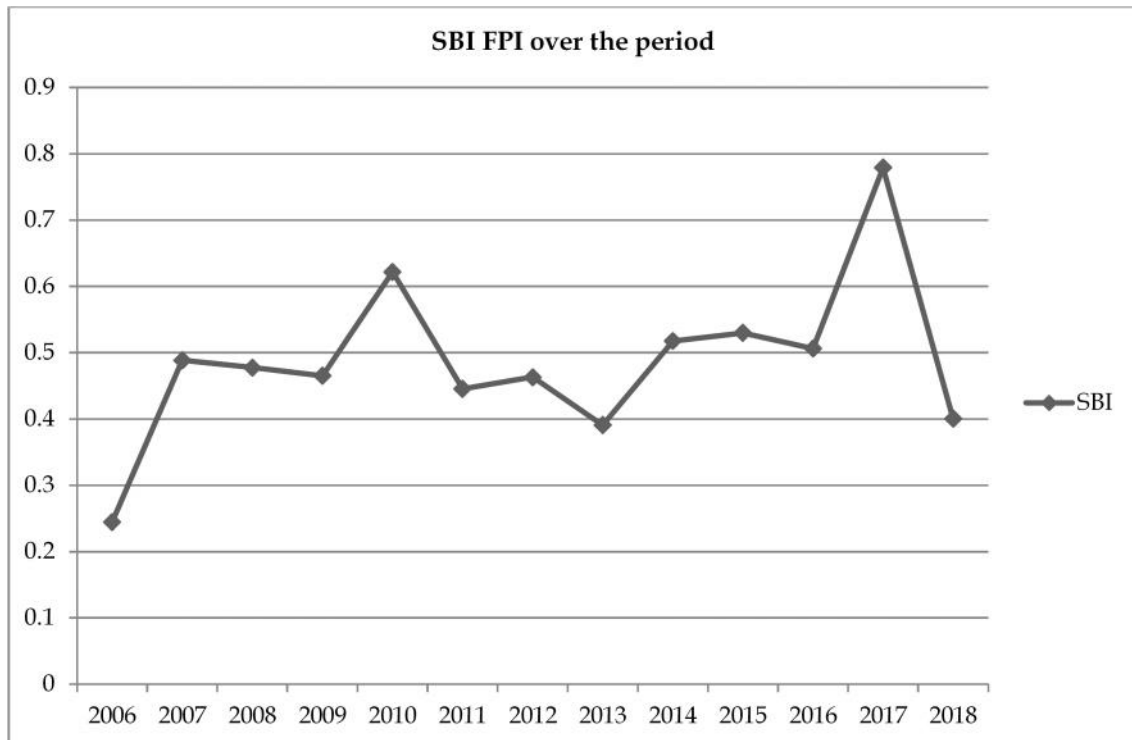
Chart1 showing FPI of one of the major Public Sector Bank

Chart 2 showing FPI of one of the major Private Sector Bank

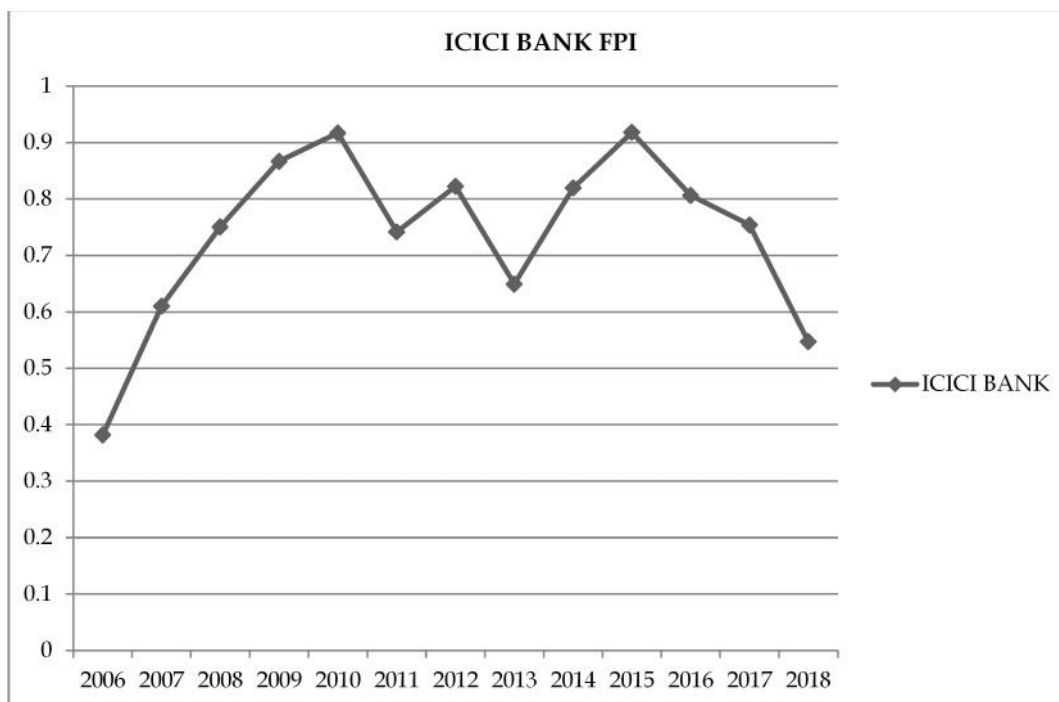
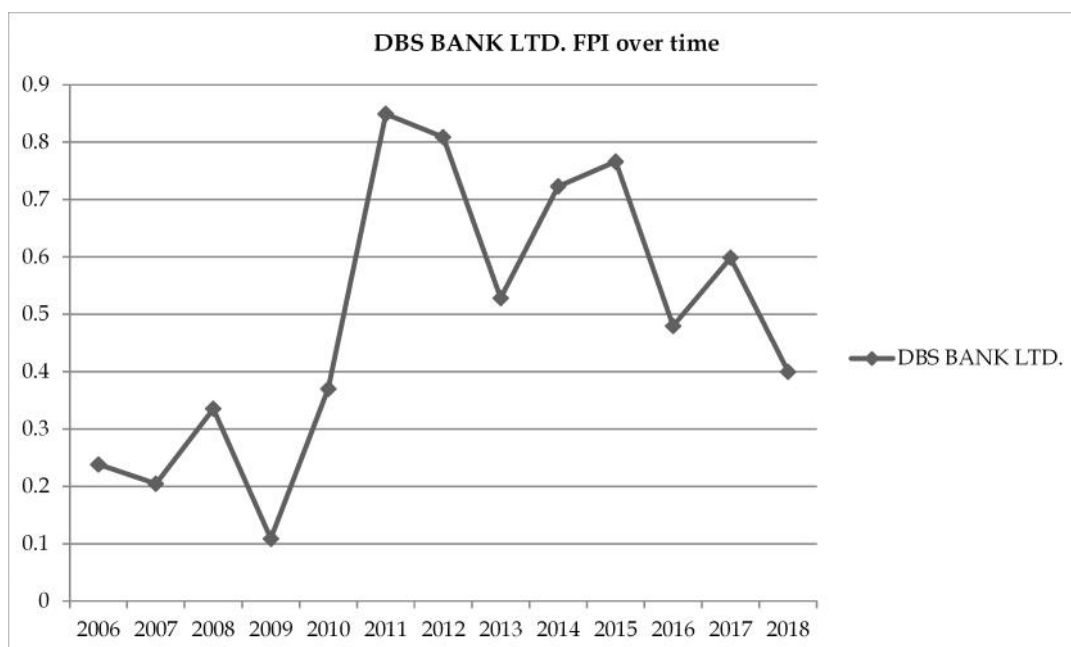


Chart 3 showing FPI of one of the major Foreign Bank



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