Prediction of Survival Time And Relevance of Profitability And Efficiency Ratios as Warning Signals in Indian Banks

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ABSTRACT - As the role of the financial sector growing day by day in contributing to the Indian GDP, many financial institutions started their own strategies to stand forefront in the competition. The institutions those who are strategically planning to compete on the right path are going forward and retaining their positions while as the others are landing into distress and their survival itself becoming a big question mark. This situation is not exception in Indian Banking Industry. Though the government of India is strenuously making efforts to support Public Sector, either by way of infusing capital or by way of merging weak banks with strong banks, the other sectors of the banks do not have the option either to die or to loose their identity by merging with other institutions. In this present status of Banking Sector, the investigator intends to find out the survival time among the different ownership patterns of the Indian banking sector and to find out the relevance of financial and efficiency ratios as warning signals in predicting the probability of failure of the Indian banks. The study find out that existence of survival times among the different ownership patterns in Indian Banking sector through survival analysis, and also found that financial ratio of Average cost fund, efficiency ratio of Total Income to Compensation to Employees and Net Interest Income to Interest Earned found significant in predicting the probability of failure of Indian Banks through Cox Proportional Hazard Model. The study also made an attempt to find out the different predicting variable among different ownership patterns as public sector banks are continuously supported by the government of India for their survival in many ways.

Key Words: Efficiency Ratio, Indian Banking Sector, Survival Time, Predictor Variables, Profitability Ratio,

JEL Classification:G21

I. INTRODUCTION

Since 1969 till date in Banking sector there has been as many as 34 mergers and amalgamations. There were at least 25 cases where private sector banks merged with the Public Sector Banks and some of them were induced mergers while several others were voluntary driven mostly by the weak financials of the banks that merged, Post 1999 however witnessed that even healthy banks were merged driven by the business and commercial considerations. But these banks are struggling to survive due to mismanagement of internal and external policies. To sustain their survival, they are adopting many strategies ranging from restructuring to merging of one bank with another or infusing further capital for their survival.

STATEMENT OF THE PROBLEM

The failure of banks would have a devastating consequences to the entire banking system and lead to the failure of financial sector ultimately and thereby the failure of the economy as the role of the financial sector growing day by day in contributing to the Indian GDP. To sustain the competition front, these institutions are landing into troubles and their survival itself is becoming a big question mark. The Indian banking sector is no exception to this. Bank failures in India were out of control before independence in the absence of comprehensive banking legislation and structured supervision mechanism for the banks. The situation of bank failure continued after the spread of Banking Regulation Act of 1949. Almost 106 banks were liquidated during the period 1954 to 1959 either by voluntary or by compulsory liquidation. Though the government had started infusing capital into the Public Sector Banks to support the banking sector to strengthen their survival , private , foreign and co-operative banks have no other option to revive their banks except by adopting the strategy of amalgamation and merger options or to loose their identity. Hence, the present study intends to estimate the survival time of the banks and the factors responsible for failure of banks in Indian among the

different ownership pattern and their age and made an attempt to find out the relevance of profitability and efficiency ratios as warning signals in predicting the probability of failure of Indian Banks, the study is carryout out.

II. REVIEW OF LITERATURE

The following are some of the reviews pertaining to finding out the survival time and methods used to predict the failure of the companies.

Kauffman and Wang(2006) used a multi-method survival analysis to explore the drivers behind Dotcom success and failure, tested for impact of industry, firm and e-commerce specific factors on a DotCom's sustainable competitive advantage.

Steranova and Thomas(2000) in his study used survival analysis tools to predict a time till a customer default on their personal loan.

Whalen (1991) examined the usefulness of proportional hazard model as an early warning tool to bank failure prediction. He used explanatory variables to the insolvency of banks indicators as Total Loans in Total Assets, Operating Expenses in Total Assets, Net Profit on Total Assets, Total Deposits on Total Assets, Total Non-performing loans in Total Assets.

Banajdi Abiola A et.al (2015) identified the financial distress symptoms that had lead to a bank failure by employing the Cox Proportional Hazards Model using financial covariates from financial statements of banks. Their study found that banks with high non-performing loan to total loan plus lease and with high operating expense to average total assets have very high tendency of failure.

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Okezie(2011) examined the relationship between capital ratios and bank distress in Nigeria, and compared the efficiency of three capital ratios risk-weighted, leverage and gross revenue ratios in the prediction of bank distress.

Malick Sy, Richard Heaney, Tony Naughton, Dirk Hollander and Terrence Hallahan(2011) in their study used cox proportional hazards model to estimate probable time to failure of different banks in the study. They found that the banks derivate investments and credit risk variables shown predictive power while variables relating to business structure and off- balance sheet items do not have role in bank failure prediction in their study.

Molina(2002) in his study used Cox proportional hazard model with time-varying covariates to predict banking failure during banking crisis. The study used CAMEL variables as predictors and found that the failed banks had lower operational costs and higher financial expenses.

Mannasoo and Mayes (2009) in their study used survival analysis and found the joint role of macro economic, structural and bank specific factors for finding out banking failure in Eastern Europe and found the role of these variables in predicting the bank failure.

Vandana Gupta(2017) in her study used Cox proportional hazard model in predicting of default drivers for Indian Listed Companies and found ROCE,ROE as some of the predictor variables along with other variables.

Vandana Gupta(2017) used survival analysis to model the duration time that preceded a firms initial payment default and found the evidence on the significance of profitability, liquidity and solvency ratios as key predictors of default along with some micro variables.

From the literature it is clear that the many predicting models are available and many co-variates were found suitable in predicting the failure of the institutions. The present study used survival analysis for predicting the survival time and Cox hazard Proportional model for finding out the co-variates for predicting the failure of the banks of different ownership patterns in Indian Banking Sector.

Objectives of the present study:

1) To find out the survival time and to compare the survival time of different banks among different ownership patters and different age groups.

2) To Find out the relevance of financial and efficiency ratios in predicting the failure of banks.

III. RESEARCH METHODOLOGY

The study is based on secondary data. The date was collected from PROWESS database. Banks were categorised according to their ownership patterns viz., Public Sector Banks, Private Sector Banks, Foreign Banks and Co-operative Banks in the study. These banks were also categorised based on their ages viz., those established before 1950, 1951 to 1971, 1972-1985, 1986-1990 and After 1991. All these banks both merged (irrespective of

their motive either voluntarily, to attain universal banking objective or forceful) banks and those functioning as on 2016 were considered for the study. Merger of the bank was considered as failure of banks in the present study. To find out the survival time binary form of 1 and 0 was assigned. Binary form of 1 is assigned to the bank if it is active and performing as on 2016, while 0 is assigned to those banks which were merged. To test the survival time Kaplan-Meier survival probability estimates and plots were used to compare the survival time among the different ownerships and different ages. The variables profitability ratios and efficiency ratios were considered as co- co-variates to predict the failure of the banks in the present stud. Ratios of OPM- Operating Profit Margin : NPM- Net Profit Margin; RONW- Return on Net Worth; ROTA- Return on Total Assets; ACF-Average Cost of Funds were considered under profitability ratios, while the ratios of TITA- Total Income/Total Assets; IIWF-Interest Income of Banks as % of Working Funds; OPWF-Operating Profits of Banks as % to Working Funds; NIIE-Net Interest Income/Interest Earned were considered under efficiency ratios. Cox Proportional Hazard Model was used to predict the relevance of profitability and efficiency ratios as warning signals in predicting the failure of the banks in the present study.

SURVIVAL TIME OF BANKS AMONG DIFFERENT OWNERSHIP PATTERNS

To find out the survival time of the Indian Banks, Kalpan-Meier model is used the survival probability estimates and plots were shown in Table-1 and Table-2.

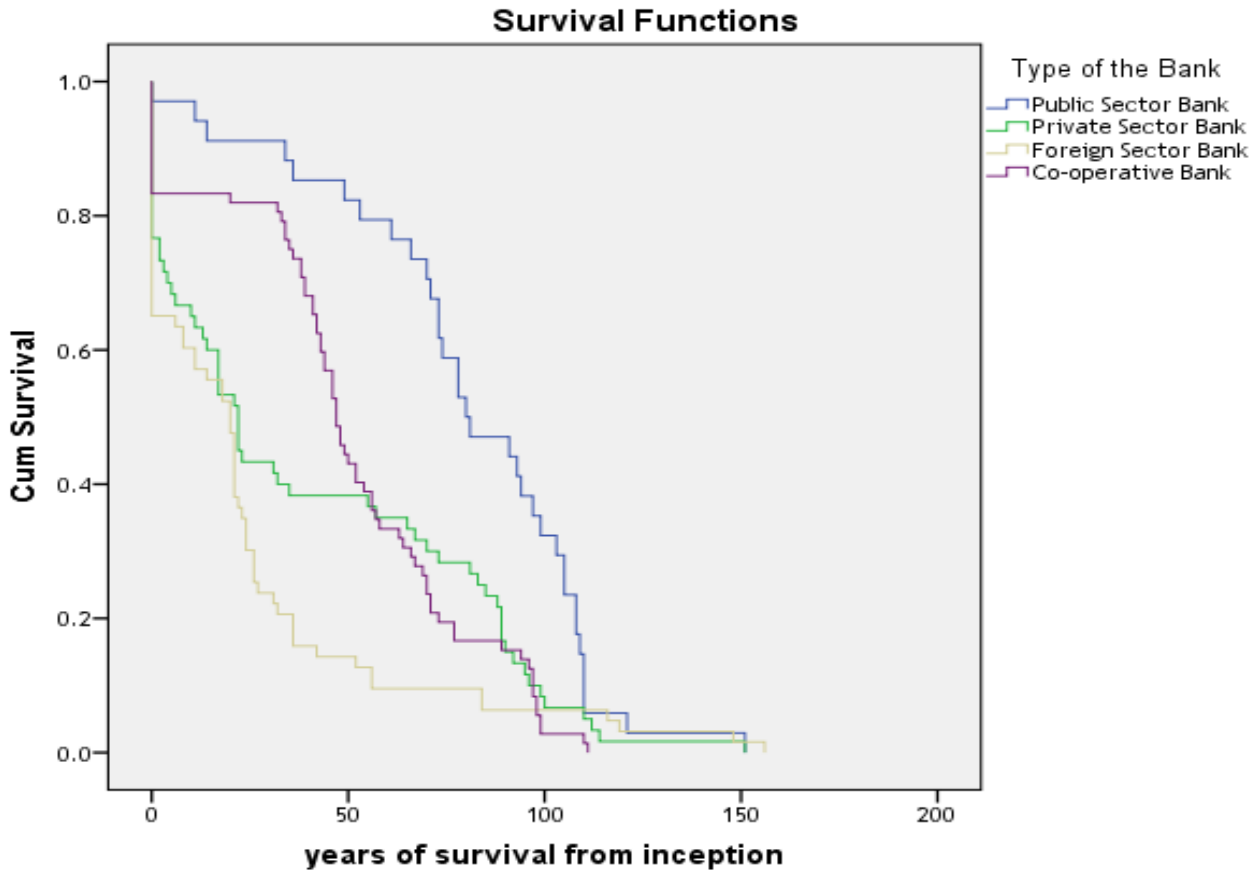
Table-1 Shows that overall survival time of banks shown as 45 years; while the Public Sector Banks have survival time of 78.88 years followed by Private Sector Banks, Co-operative Sector Banks as 40 years and 50 years respectively, while as foreign banks have survival time of 25 years only. The significance of the survival time of the banks were also tested by using three diagnostic tests shown in the Table- which clearly shows the results of three tests log rank,(Mantel-Cox), Breslow(Generalised Wilcoxon) and Tarone-Ware were significant at 5 per cent. This results implies that there is a statistical evidence to show that the survival time of different sector banks differs significantly in India.

Table-1

Means and Medians for Survival Time								
Type of the Bank	Mean[a]				Median			
	Estimate	Std. Error	95% Confidence Interval		Estimate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound			Lower Bound	Upper Bound
Public Sector Bank	**79.882**	**5.734**	**68.644**	**91.120**	**80.000**	**9.913**	**60.571**	**99.429**
Private Sector Bank	**40.300**	**5.393**	**29.730**	**50.870**	**22.000**	**3.425**	**15.286**	**28.714**
Foreign Sector Bank	**25.175**	**4.389**	**16.572**	**33.777**	**20.000**	**2.523**	**15.056**	**24.944**
Co-operative Bank	**50.000**	**3.636**	**42.873**	**57.127**	**47.000**	**2.356**	**42.382**	**51.618**
Overall	**45.066**	**2.596**	**39.977**	**50.154**	**38.000**	**3.783**	**30.586**	**45.414**
a. Estimation is limited to the largest survival time if it is censored.								

Table-2

Overall Comparisons			
	Chi-Square	Df	Sig.
Log Rank (Mantel-Cox)	**26.193**	**3**	**.000**
Breslow (Generalized Wilcoxon)	**49.339**	**3**	**.000**
Tarone-Ware	**44.624**	**3**	**.000**
Test of equality of survival distributions for the different levels of Type of the Bank.			



SURVIVAL TIME OF DIFFERENT BANKS AMONG DIFFERENT AGE GROUPS OF INDIAN BANKS

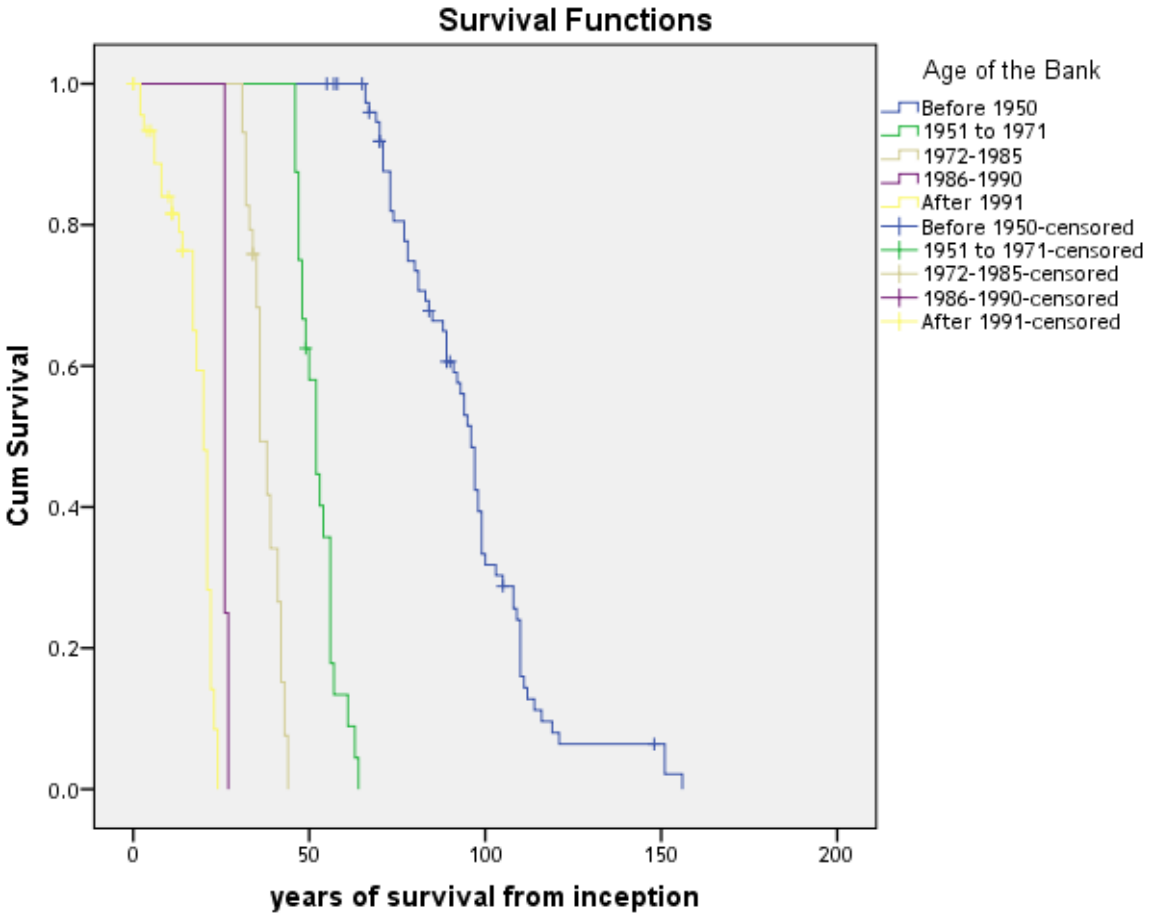
Table-3 shows the survival time of banks based on their age represented by their year of incorporation. Overall survival time of banks by their ages shown as 62 years while banks incorporated before 1950 have survival time of 95.97 years followed by banks established between 1951 to 1971 with 52.57 years; banks established between 1972-1985 with 37 years; banks established between 186-90 years with 26 years of survival time and banks established after 1991 have survival time of 17 years. The significance of these estimates were tested by using three diagnostic tests which were shown significant at 5 per cent level. This clearly shows that the survival time of banks differ by the age of the banks significantly in India.

Table-3

Means and Medians for Survival Time								
Age of the Bank	Mean[a]				Median			
	Estimate	Std. Error	95% Confidence Interval		Estimate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound			Lower Bound	Upper Bound
Before 1950	**95.974**	**2.547**	**90.982**	**100.966**	**96.000**	**1.767**	**92.536**	**99.464**
1951 to 1971	**52.577**	**1.135**	**50.353**	**54.802**	**52.000**	**1.543**	**48.976**	**55.024**
1972-1985	**37.572**	**.797**	**36.011**	**39.134**	**36.000**	**1.085**	**33.874**	**38.126**
1986-1990	**26.250**	**.250**	**25.760**	**26.740**	**26.000**	**.**	**.**	**.**
After 1991	**17.588**	**.970**	**15.686**	**19.490**	**20.000**	**.792**	**18.447**	**21.553**
Overall	**62.205**	**2.825**	**56.667**	**67.743**	**56.000**	**6.662**	**42.943**	**69.057**
a. Estimation is limited to the largest survival time if it is censored.								

Table-4

Overall Comparisons			
	Chi-Square	df	Sig.
Log Rank (Mantel-Cox)	**364.619**	**4**	**.000**
Breslow (Generalized Wilcoxon)	**300.571**	**4**	**.000**
Tarone-Ware	**330.599**	**4**	**.000**
Test of equality of survival distributions for the different levels of Age of the Bank.			



To find out the Hazard Ratios:
Table-5

Omnibus Tests of Model Coefficients[a]									
-2 Log Likelihood	Overall (score)			Change From Previous Step			Change From Previous Block		
	Chi-square	Df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
1422.064	221.724	10	.000	103.671	10	.000	103.671	10	.000
a. Beginning Block Number 1. Method = Enter									

Table-6

Variables in the Equation								
	B	SE	Wald	Df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
OPM	-.005	.007	.431	1	.512	.995	.981	1.010
NPM	.001	.010	.018	1	.894	1.001	.981	1.022
RONW	-.002	.002	.715	1	.398	.998	.994	1.002
ROTA	.018	.146	.016	1	.900	1.019	.765	1.356
ACF	.097	.057	2.910	1	.088	1.102	.986	1.232
TITA	-.210	.396	.282	1	.595	.810	.373	1.761
TICE	.060	.012	24.441	1	.000	1.062	1.037	1.087
IIWF	-.002	.005	.270	1	.604	.998	.988	1.007
OPWF	-.001	.006	.036	1	.849	.999	.987	1.011
NIIE	-.014	.002	51.025	1	.000	.986	.983	.990

Hazard function and estimated parameters

Table-7

Predictor Variables		Hazard Ratio	Parameter Coefficients	Sig
Profitability ratios (%)				
Operating profit margin	OPM	.995	-.005	.512
Net profit margin	NPM	1.001	.001	.894
Return on net worth	RONW	.998	-.002	.398
Return on total assets	ROTA	1.019	.018	.900
Average cost of funds (%)	ACF	1.102	.097	.088**
Efficiency ratios				
Total income / total assets	TITA	.810	-.210	.595
Total income / compensation to employees	TICE	1.062	.060	.000*
Interest income of bank as % of working funds	IIWF	.998	-.002	.604
Operating profit of bank as % to working funds	OPWF	.999	-.001	.849
Net interest income / interest earned	NIIE	.986	-.014	.000*
Number of Banks	229			
Failure Banks	26			

* indicate significant at 1% level, and ** indicates significant at 10% level.

A Hazard Ratio of less than 1 explains that an increase in one unit of the variable decrease the probability of being failure, while Hazard Ratio of 1 indicate that variable is having no impact on the survival while as Hazard Ratio greater than 1 indicates more rapid hazardness. If the co-efficients of variables are negative it indicates that an increase in one unit of the variable decrease the failure of the bank.

From the Table-7 it is clear that the Financial Ratios of OPM,NPM,ROTA and ACF and Efficiency ratios of TITA,TICE,IIWF and NIIE found to be relevant in predicting the failure and acting as warning signals in the present study. OPM,RONW,TITA,IIWF,OPWF,NIIE ratios were showing negative value which indicates that an increase in there variables should reduce the probability of failure of the banks, but in the present study these variable do not significant statistically except the variable NIIE. Hence from the study it is clear that an increase in NIIE only should reduce the probability of failure of banks.

The variables NPM,ROTA,ACF,TICA shown positive values which indicate an increase in eighter of these variables increases the failure of the banks, but these variables are not statistically significant except TICA and ACF at 1 % and 10 % levels respectively. The variables ACF,TICA and NIIE are significant and are showing hazard ratio of 1.1.2, 1.062 and 0.986 respectively from highest to lowest hazardness.

The hazard ratio of the variable Average Cost of Funds(ACF) is worked out as 1.102 which is registered highest among the variables considered in the study. This indicates that one per cent of increase in ACF may lead to 1.102 times probability in failure of the banks in comparision of banks that are not increasing ACF. This is supported by statistically significant value at 10 per cent level.

The hazard ratio of the variable Total Income to Compensation to Employees (TICE) shown that one per cent increase in TICE increases the risk of failure of the banks by 1.062 per cent. This variable shown statistically significant at 1 per cent level. Similarly the variable which is found significant is NIIE. This variable shown negative sign indicates that one per cent increase in NIIE of the banks reduces the 0.986 per cent of probability of failure of the banks in the present study. Hence the present study supported that the profitability and efficiency ratios are relevant in predicting the failure of the banks and accordingly measures should be taken to reduce the failure of banks.

Banking failures in India were out of control before Independence in the absence of comprehensive banking legislations and structured mechanism for the banks. The situation of banks failure continued even after the spread of Banking Regulation Act of 1949. Almost 106 banks were liquidated during the period 1954-1959 either by voluntary or by compulsory liquidation. After 1960, RBI received formal powers to amalgamate banks.

Government of India is making strenuous efforts in supporting the survival of Public Sector Banks by infusing capital other sectors of the banks do not have the option either to die or to loose their identity by merging with other banks. Public Sector Banks were continuously, infused with capital for their survival.

The recapitalisation process ways back in 1993-95 where 10,987.12 crores were pumped into PSBs for recapitalisation. While Rs.1,300 crore were infused, Rs.1,900 crore and Rs.1,200 crore in the years 2008-09 and 2009-10 respectively. This amount has been drastically, increased to Rs.20,117.23 crores ; Rs.12,000 crores ,Rs.12,517crores Rs.14,000 crores,Rs.6,90crores, Rs.7,940 crores, and 25,000 crores in the years 2010-11,2011-12,2012-13,2013-14.2014-15, 2015-16 and 2016-17 respectively. In this context the investigator even made an attempt to find out the variables to significant in predicting the failure of the banks and to be used as warning signals with the help of splitting the data by grouping the variables by ownership pattern and comparing the variables among the different ownership patterns viz., Public Sector, Private Sector Banks, Foreign Sector Banks and Co-operative Banks. The results are shown in the Tables.8,9,10 &11.

Table-8

Omnibus Tests of Model Coefficients	
Type of the Bank	-2 Log Likelihood
Public Sector Bank	2426.965
Private Sector Bank	2329.501
Foreign Sector Bank	3294.917
Co-operative Bank	1812.325

Block 1: Method = Enter

Table-9

Omnibus Tests of Model Coefficients[a]										
Type of the Bank	-2 Log Likelihood	Overall (score)			Change From Previous Step			Change From Previous Block		
		Chi-square	Df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
Public Sector Bank	2381.820	35.650	10	.000	45.145	10	.000	45.145	10	.000
Private Sector Bank	2278.549	102.718	10	.000	50.952	10	.000	50.952	10	.000
Foreign Sector Bank	3255.926	38.874	10	.000	38.991	10	.000	38.991	10	.000
Co-operative Bank	1791.443	22.350	10	.013	20.882	10	.022	20.882	10	.022
a. Beginning Block Number 1. Method = Enter										

Table-10

Variables in the Equation									
Type of the Bank		B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
								Lower	Upper
Public Sector Bank	OPM	-.040	.038	1.128	1	.288	.961	.892	1.034
	NPM	.024	.094	.066	1	.798	1.024	.851	1.233
	RONW	.028	.020	1.839	1	.175	1.028	.988	1.070
	ROTA	-.767	1.068	.516	1	.473	.464	.057	3.768
	ACF	1.607	.383	17.639	1	.000	4.988	2.356	10.559
	TITA	-114.681	29.605	15.006	1	.000	.000	.000	.000
	TICE	-.137	.044	9.606	1	.002	.872	.800	.951
	IIWF	-.109	.079	1.917	1	.166	.896	.768	1.046
	OPWF	.572	.416	1.891	1	.169	1.772	.784	4.006
	NIIE	.095	.036	7.121	1	.008	1.100	1.026	1.179
Private Sector Bank	OPM	-.038	.010	14.965	1	.000	.962	.944	.981
	NPM	-.066	.031	4.434	1	.035	.936	.880	.995
	RONW	-.003	.005	.432	1	.511	.997	.986	1.007
	ROTA	.883	.363	5.909	1	.015	2.418	1.187	4.929

	ACF	.018	.064	.078	1	.780	1.018	.897	1.155
	TITA	.204	.247	.679	1	.410	1.226	.755	1.990
	TICE	.036	.016	4.896	1	.027	1.037	1.004	1.071
	IIWF	.000	.001	.103	1	.748	1.000	.999	1.002
	OPWF	-.006	.075	.006	1	.940	.994	.858	1.152
	NIIE	.024	.009	6.859	1	.009	1.025	1.006	1.044
Foreign Sector Bank	OPM	-.015	.005	8.770	1	.003	.985	.976	.995
	NPM	.023	.009	7.282	1	.007	1.023	1.006	1.040
	RONW	-.006	.003	3.421	1	.064	.994	.988	1.000
	ROTA	-.231	.081	8.222	1	.004	.794	.678	.930
	ACF	.098	.039	6.222	1	.013	1.102	1.021	1.190
	TITA	-2.437	1.855	1.727	1	.189	.087	.002	3.313
	TICE	.003	.010	.117	1	.732	1.003	.984	1.023
	IIWF	-.101	.041	6.097	1	.014	.904	.834	.979
	OPWF	.072	.048	2.244	1	.134	1.075	.978	1.181
	NIIE	.010	.003	10.851	1	.001	1.010	1.004	1.016
Co-operative Bank	OPM	.015	.016	.915	1	.339	1.015	.984	1.047
	NPM	-.009	.017	.239	1	.625	.992	.958	1.026
	RONW	-.001	.002	.332	1	.564	.999	.994	1.003
	ROTA	.162	.215	.567	1	.452	1.176	.771	1.793
	ACF	.181	.071	6.501	1	.011	1.199	1.043	1.378
	TITA	.045	.155	.083	1	.773	1.046	.771	1.418
	TICE	-.112	.043	6.793	1	.009	.894	.822	.973
	IIWF	.001	.001	.764	1	.382	1.001	.999	1.004
	OPWF	.000	.000	.368	1	.544	1.000	.999	1.001
	NIIE	.012	.011	1.117	1	.291	1.012	.990	1.035

From the Table-11 it is clear that different variables shown different hazard ratios among different ownership patterns of Indian Banking Sector. From the table it is evident that the variable ACF is significantly figured as Hazardous Ratio almost in all the sectors except in Private Sector Banks. TICE ratio also found to be as a warning signal in the failure of Public, Private and Co-operative Banks but not in Foreign Sector Banks. NIIE is the variable which is shown relevant in predicting the failure of the bank in the present study. Apart from these variables, the variables OPM, NPM, ROTA and IIWF also shown significant in predicting the warning signals of Private Sector and Foreign Sector Banks in the present study.

Table-11

Name of the ownership pattern	**Type of Ratio**	**Predictor Variables**	Code	Hazard Ratio	Parameter Coefficients	p-value
Public Sector Banks	Profitibility Ratios(%)	Average cost of funds (%)	ACF	4.998	1.607	.000*
	Efficiency Ratios(%)	Total income / compensation to employees	TICE	.872	-0.137	.002**
		Net interest income / interest earned	NIIE	1.100	.095	.008**
Private Sector Banks	Profitibility Ratios(%)	Operating Profit Margin	OPM	.962	-0.038	.000*
		Net Profit Margin	NPM	.936	-0.066	.035**
	Efficiency Ratios(%)	Total income / compensation to employees	TICE	1.037	0.036	.027**
		Net interest income / interest earned	NIIE	1.025	0.024	.009**
Foreign Sector Banks		Operating Profit Margin	OPM	0.985	-0.015	.003**

	Profitibility Ratios(%)	Net Profit Margin	NPM	1.023	0.023	.007**
		Return on net worth	RONW	0.994	-0.006	.064***
		Return on total assets	ROTA	0.794	-0.231	.004**
		Average cost of funds (%)	ACF	1.102	0.098	.013**
	Efficiency Ratios(%)	Interest income of bank as % of working funds	IIWF	0.904	-0.101	.014**
		Net interest income / interest earned	NIIE	1.010	0.010	.001**
Co-operative Banks	Profitibility Ratios(%)	Average cost of funds (%)	ACF	1.199	0.181	.011**
	Efficiency Ratios(%)	Total income / compensation to employees	TICE	0.894	-0.112	.009**

* indicate significant at 1% level, ** indicates significant at 5% level and *** indicates significant at 10% level.

IV. FINDINGS OF THE STUDY

The study find out the existence of different survival times among the different ownership patterns of Indian Banking sector through survival analysis. From the study it is very clearly found that the Indian Banks established after 1991 were found minimal survival time compared to the banks established before 1950s. Further the study found different survival time for different ownership patterns of Indian Banks. Overall average survival time of Indian Banks found to be 45 years where as Public Sector Banks found longer survival time of 78.88 years. This might be because of the continuously infused capital by the Government into Public Sector Banks. Whereas the other ownership pattern banks do not have this facility which may have an option of either to merge with other banks or to disappear from the structure. The study also found the relevance of profitability and efficiency ratio in predicting the warning signals In Indian Banks for their immediate recovery. Ratios of Average cost fund, efficiency ratio of Total Income to Compensation to Employees and Net Interest Income to Interest Earned found significant in predicting the probability of failure of Indian Banks through Cox Proportional Hazard Model. Ratios of Operating Profit Margin (OPM), Net Profit Margin (NPM), Return on Total Assets (ROTA), Net Interest Income to Interest Earned (NIIE) and Interest income of bank as % of working funds (IIWF) also shown significance in predicting the warning signals of Indian Banking Sector. Hence these banks should take immediate steps for their recovery so as to increase the confidence of the stake holders and to contribute for the growth of the Indian economy rather become white elephants of the Indian Economy.

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