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Abstract:

There is hardly any study in the existing literature regarding the foreign banks' exit decision in India. This study tries to identify the CAMEL (i.e., C=Capital adequacy, A=Asset quality, M=Management decision, E=Earning ability and L=liquidity) variables that could qualify as the determinant of foreign banks closing their business operations in India which entered after the financial sector reforms. Logistic Regression Model was used to identify the risk factors associated with the closure of business-operation of foreign banks in India. It seems that foreign banks with higher non-performing assets (NPAs), lower return on equity and lesser profit per employee were more likely to close their business in India than otherwise.

1. Introduction:

Foreign banks are those banks which incorporated as well as whose head office are situated outside India. These banks were also known as exchange banks and established in India during the late 19th and early 20th centuries. The organised system of banking originated in India with establishment of the foreign banks. These banks established mainly due to the development of trade with other countries during that period. Their main business was to finance foreign trade and they had branches only in principal port towns such as Mumbai, Kolkota and Chennai (Gomez, 2008). Over a period, foreign banks became an important part of the Indian banking and financial system.

At the end of March 1991, there were 21 foreign banks from a large number of countries cutting across, Europe, United States and the Far East, having as many as 145 offices operating across the country. India's economy and financial systems, prior to 1991 economic reforms were heavily regulated and dominated by the public sector (Tarapore, 1999). Following a balance of payment crisis in 1991, however, a number of structural reforms were implemented that greatly deregulated most of the financial systems on the recommendations of the Committee on Financial System (CFS) (Mohan, 2006; Gormley, 2010). One of the CFS' recommendations was to increase the efficiency of financial system in order to meet the credit needs of firms effectively by allowing entry of more foreign banks in India. It was argued that the entry of additional foreign banks would improve the competitive efficiency of Indian banking system (Claessens et al., 2001; Clarke, 1999; Gormley, 2010; Unite and Sullivan, 2002).

Following India's 1994 commitment to the world trade organisation (WTO), to allow greater foreign bank entry, the share of foreign banks in all scheduled commercial banks in India increased significantly. As on March 2009, India had 31 foreign banks with 295 branches operational across the country.

Banks deals with people's most liquid assets (cash) and run a countries financial system. Therefore, it is important to develop models that can assess the banks financial condition robustly. The most common measure of banks financial condition is the CAMEL (C=Capital adequacy, A=Asset quality, M=Management decision, E=Earning ability and L=liquidity) ratings. However, due to the cost and regulatory burden consideration, CAMEL rating is assigned relatively infrequently; therefore, economic models are useful in providing complementary information of the probability of bank failure (Cole and Gunther, 1998).

Most of the studies on the operations of foreign banks in India, mainly focused on their impact, efficiency, profitability and productivity performance (Gormley, 2010; Keshari and Paul, 1994; Sathey, 2005; Sensharma, 2006; Zhao et al., 2010). Currently, in the existing literature, there is hardly any study regarding the determinants of foreign Banks' exit in India. The present study proposes logistic regression technique to construct a model based on CAMEL variables which can predict closure of business operations of foreign banks in India. Despite the existence of other multivariate statistical models that could be used in modelling and prediction, Logistic regression model was preferred because of its statistical advantages. Logistic Regression does not face the strict assumptions such as multivariate normality and equal variance–covariance matrices across groups (Hair et al; 1995).

2. Literature Review:

In this study, the empirical model was predominantly based on the literature regarding bank failures and acquisitions. Ever since the pioneer work of Beaver (1966) and Altman (1968), the prediction of bankruptcy has been actively studied by academics, practitioners and regulators. Beaver (1966) adopted univariate approach of discriminant analysis in order to assess the individual relationships between financial statement data i.e. predictive variables and subsequent failure events. Altman (1968) expanded the univariate approach to multivariate discriminant analysis, allowing one to assess the relationship between failure and a set of financial variables. The two assumptions in discriminant analysis (a) that the financial statement data is normally distributed; and (b) that the variance-covariance matrices of failed and non failed banks are equal, were proven to be violated frequently by various consecutive studies. There are several drawbacks associated with the OLS estimation of the linear probability model, but the primary problem is that the predicted range of values of the dependent variable is not limited to between zero and one. In this respect, it was Martin (1977), who introduced the first method of failure prediction that did not make any restrictive assumptions regarding the distributional properties of the predictive variables. The logistic regression, often referred to as the logit model, until recently has been the most employed statistical method for the purpose of failure prediction. In a study of the failure of small commercial banks, Crowley and Loviscek (1990) showed that the logit model offers an advantage over the more frequently used discriminant analysis and linear probability models. Subsequently, various studies showed that logistic regression produces a more accurate model than multiple discriminant analysis (Espahbodi, 1991; Lennox, 1999).

Sinkey (1975), suggested that the asset composition, loan characteristics, capital adequacy, sources and uses of revenue, efficiency and profitability are useful to distinguish problematic from non-problematic bank. Similarly, Martin (1977) by employing logistic regression found that only four of the 25 selected predictive variables, representing asset quality, capital adequacy, and earnings were qualified as failure determinants. Avery and Hanweck (1984) also used the logit model and their results were consistent with that of Martin (1977). Barth et al. (1985), employing the logit model, find liquidity to be an important factor in addition to asset quality, capital adequacy, and earnings in relation to subsequent failures. Further, Thomson (1991), in a study on FDIC-insured commercial banks, examines the predictive accuracy of the logit model employing predictive variables that proxy for asset quality, capital adequacy, earnings, liquidity and management quality. The results of Thomson (1991), based on failures between 1984 and 1989, demonstrated that the probability of bank failure is a function of variables proxying for all five risk factors mentioned above. Estrella et al. (2000), employing a logit model, examine and compare the effectiveness of simple and more complex risk-weighted capital ratios, representing the risk factor capital adequacy. They conclude that simple capital ratios predict bank failures as well as the more complex risk-weighted capital ratios and that therefore, the risk factor capital adequacy can without problems be proxied by a number of simple capital ratios. In a recent study by Andersen (2008), a logit model is used to determine the most relevant predictors of defaults of Norwegian banks. Out of an initial set of 23 predictive variables, Andersen (2008) found six predictors to be most relevant. These six predictors could, consistent with numerous previous studies, be categorized into the general risk factors capital adequacy, asset quality, earnings, and liquidity.

Most of the studies described above appear to be able to achieve adequate performances regarding the prediction of defaults. Concerning the risk factor that determine the financial condition of a bank, there seems to be a consensus that identifies capital adequacy, asset quality, earnings and liquidity as being the most important.

3. Research methodology:

3.1 Data and Variables

During the study period i.e. from June 1993 to March 2007, twenty foreign banks entered in India. Of these 20 foreign banks, eight banks closed their operations in India.

Reserve bank of India (RBI) publishes 35 different financial ratios of scheduled commercial banks each year (RBI, 1995-2007). Of these financial ratios, 12 ratios were shortlisted on the basis of their importance in CAMEL ratings used by regulators worldwide. Further, these 12 ratios were grouped into five different categories, corresponding to CAMEL each describing a unique financial characteristics of foreign bank. The list of the variables selected finally for the present study along with their groupings is given in Table 1.

Hypotheses

This research aims to test the predictability of foreign banks closure in India using statistical techniques. Two null hypotheses are developed as follows:

H_1: **The variables used in this research have qualities as failure determinants.**

H_2: **Logistic regression can help in predicting closure of business operations of foreign banks in India.**

H_1 is developed based on the proposition that a variable is considered reliable if it can differentiate the operating from non-operating foreign banks significantly (at 95% confidence level). Mann-Whitney test was used for testing the independence of sample medians. Variables, which are found to be related to closure of the foreign banks, will then be used to run the Logistic regression model to test the H_2.

3.2 Logistic Regression:

Logistic regression is a binomial statistical technique, which has dependent variables (operating and non-operating foreign bank) that have a range of values between 0 and 1. This technique has been commonly used in various research to estimate the likelihood of an event occurring based on a set of prognostic factors. The logistic regression models predict the conditional probability of closure of the foreign bank given a set of independent variables for that bank.

In the simplest case of one predictor X and one dichotomous outcome variable Y, the logistic regression model predicts the logit of Y from X. The logit is the natural logarithm (ln) of odds of $Y = 1$ (the outcome of interest i.e. closure of the foreign bank). The simple logistic model has the form:

$$\text{logit}(Y) = natural \ \log(odds) = \text{In}\left(\frac{P}{1-P}\right) = \alpha + \beta X$$

The more complex logistic model is in the same form as multiple regression equation and is given by

$$\text{In}\left(\frac{P}{1-P}\right) = \text{logit} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k$$

Hence,

$$\text{Probablity}\left(Y = \text{outcome of interest} \mid X_1 = x_1, X_2 = x_2, \ldots\ldots, X_k = x_k,\right)$$

$$= P = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k}}$$

Where, P is the probability of "event (i.e., exit of a foreign bank)" under the outcome variable Y, α is the Y intercept, βs are the regression coefficients (or slope

parameters), and Xs are a set of predictors (i.e. CAMEL variables). X can be categorical or continuous, but Y is always categorical. Both the Y intercept and the slope parameter are estimated by the maximum likelihood (ML) method.

Logistic regression is considered superior to linear regression because, the former assumes a log-linear relationship between the dependent and independent variables, which means there is no restriction of normal distribution assumption for the independent variables. On the other hand, linear regression which assumes a linear relationship between the dependent and independent variables requires strict assumption of normal distribution for its independent variables, which can hardly be met by financial determinants. Moreover, in the OLS estimation of the linear probability model, predicted range of values of the dependent variable is not limited to between zero and one.

5. Results and Discussions:

5.1 Descriptive Statistics:

During the period June 1993 to March 2007, twenty foreign banks started their business operations in India. In terms of their country of incorporation these banks were mostly from Asia (12) followed by Europe (5), North America (2) and Africa (1). Eight foreign banks closed their business operations in India of which majority were European banks (4) followed by Asian banks (3) and North American bank (1). As on March 31, 2007, India had 29 foreign banks with 272 offices operating across the country.

The Test of Hypothesis H_1: The variables used in this research have qualities as failure determinants.

General characteristics pertaining to CAMEL variables for sample banks one-year prior to closure/exit are presented in Table 2. Most of the variables are not normally distributed. As expected, the average value of the following variables seem to be different for the operating and non-operating foreign banks: Capital Adequacy Ratio, Ratio of net NPA to net advances, Business per employee, Profit per employee, Return on assets, Return on equity, Ratio of intermediation cost to total assets, Cash-Deposit ratio and Investment-Deposit ratio.

From the Mann-Whitney test, we found that the following variables are significantly different for operating and non-operating foreign banks in India (Table 3).

    i.   Ratio of net NPA to net advances

    ii.   Ratio of intermediation cost to total assets

    iii.   Return on assets

iv.   Return on equity

v.   Profit per employee (in Rs. lakh)

This study did not find that Capital Adequacy Ratio which indicates the banks capacity to sustain financial burden during financial crisis, to be significantly different for the operating and non-operating foreign banks in India. As expected, it was found that ratio of net NPA to net advances; one of the asset quality variables was significantly different for the operating and non-operating foreign banks. This is consistent with the findings of Hwang et al., (1997). Similar to Wheelock and Wilson (2000), this study finds that all the management quality variables are significantly different for working and non-working banks. From, the 'earnings ability' variables, it was seen that the foreign banks that closed their business in India had significantly lower return on both assets and equity than the operating foreign banks. These results are in line with the findings of Miller and Noulas (1995) and Hwang et al., (1997). Further, the ratio of intermediation cost to total assets is higher for non-operating foreign banks as compared to the operating ones. This study did not find any of the liquidity related variables significantly different between the sample groups.

5.2 Logistic Regression Model:

The five variables that can differentiate the operating from non-operating foreign banks significantly at 95% level of significance based on the Mann-Whitney test were used to generate univariate logistic regression model. Summary results of the univariate logistic regression are given in Table 4, where, -2LL is the value of -2 times the log of the likelihood (similar to goodness of fit). It measures how well the estimated model fits the data. β is the coefficient of independent variables. S.E. is the standard error of the β. Significance represents the (partial) contribution of each independent variable in the model.

In the univariate logistic regression results, we find that except for the Return on assets variable all other remaining variables significantly affected the exit decision of foreign banks in India. Foreign banks with higher NPAs were more likely to close their business operations in India. In addition, Ratio of intermediation cost to total assets and Return on equity representing the efficiency factor of the banks were significantly different for the operating and non-operating foreign banks which supports the fact that efficient management of capital resources plays an important role in firms' survival. Similarly, foreign banks with lower profit per employee were more likely to close their business in India than otherwise. However, return on assets, one of the earning variables is not associated with the closure of the foreign bank.

We incorporated three variables i.e. Ratio of net NPA to net advances, Return on equity and profit per employee which are representing asset quality, earnings, and management quality respectively that are found to be significant in univariate logistic regression to generate the final prediction model in the multivariate logistic regression. Summaries of the variables incorporated in the models resulted from the

logistic regression are presented in Table 5. In the multivariate logistic model, it was seen that only Ratio of net NPA to net advances was associated with the exit decision of foreign banks in India. From Table 6, it was observed that, Return on equity is highly correlated with Profit per employee and moderately correlated with Ratio of net NPA to net advances, which explains why the Return on equity has the highest standard error among all other variables in the multivariate logistic regression model. Further, there is a significant correlation between Ratio of net NPA to net advances and Profit per employee. From these observations, it seems that foreign bank with higher NPAs have lower Return on equity and Profit per employee.

The Test of Hypothesis H$_2$: Logistic regression can help in predicting closure of business operations of foreign banks in India.

The over all prediction accuracy of the logistic regression model is 85% (Table 7). For the foreign banks that closed their business operations in India, this model has prediction accuracy of around 87%. This model recognised only one foreign bank as an operating bank though this bank had closed its business operations in India.

6. Conclusion:

The purpose of this study is to investigate whether foreign banks exit in India could be predicted using the logistic regression model. The technique is simple and imposes convenient assumptions compared to other prediction models such as the Multiple Discriminant Analysis and linear probaility models. Various earlier studies on the operations of foreign banks in India mainly focused on their impact, efficiency, profitability and productivity performance. This paper set up a theoretical framework for explaining the foreign banks exit decision through the CAMEL ratios. This forms the basis for an empirical investigation of the determinants of the exit decisions of foreign banks in India using logistic regression model.

Based on Mann-Whitney test, this study found that five CAMEL variables i.e., ratio of net NPA to net advances, Ratio of intermediation cost to total assets, Return on assets, Return on equity and Profit per employee were significantly different for the operating and non-operating foreign banks. After incorporating these five CAMEL variables in logistic regression model, it was observed that foreign banks with higher non-performing assets (NPAs), lower return on equity and lesser profit per employee were more likely to close their business in India than otherwise.

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Table 1: Variable selected for the study based on CAMEL:

Serial No.	Grouping	Variables
I.	Capital Adequacy Ratio	1. Capital Adequacy Ratio
II.	Asset Quality Ratio	2. Ratio of secured advances to total advances 3. Ratio of investments in non-approved securities to total investments 4. Ratio of net NPA to net advances
III.	Management Quality	5. Business per employee (in Rs.lakh) 6. Profit per employee (in Rs.lakh)
IV.	Earnings	7. Return on assets 8. Return on equity 9. Ratio of net interest margin to total assets 10. Ratio of intermediation cost to total assets
V.	Liquidity	11. Cash-Deposit ratio 12. Investment-Deposit ratio

Table 2. Descriptive statistics of the foreign banks that entered in India between June 1993 to March 2007.

Variable	Operating foreign banks			Non-Operating foreign banks		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
Capital Adequacy Ratio	62.9	49.4	40.9	113.5	58.7	149.0
Ratio of secured advances to total advances	72.3	75.3	24.2	71.2	72.9	21.3
Ratio of investments in non-approved securities to total investments	21.1	19.5	13.5	30.9	34.5	20.6
Ratio of net NPA to net advances	7.5	2.0	10.4	51.0	49.4	45.4
Business per employee (in Rs.lakh)	879.0	960.9	569.1	490.4	337.5	624.6
Profit per employee (in Rs.lakh)	20.5	19.8	36.5	-151.6	-39.9	290.4
Return on assets	0.7	1.6	4.8	-8.0	-4.4	13.1
Return on equity	1.6	4.4	13.9	-92.7	-17.9	190.7
Ratio of net interest margin to total assets	3.8	3.4	1.2	1.6	1.7	3.2
Ratio of intermediation cost to total assets	2.2	2.1	1.3	4.4	5.1	1.9
Cash-Deposit ratio	11.5	8.2	11.3	21.1	8.5	28.2
Investment-Deposit ratio	96.1	52.3	91.1	438.1	109.1	696.3

Table 3. Results of Mann-Whitney test of the foreign banks.

Variable	Z Value	*p* value (Asymptotic Sig.)
Capital Adequacy Ratio	-0.270	0.787
Ratio of secured advances to total advances	-0.540	0.459
Ratio of investments in non-approved securities to total investments	-0.734	0.463
Ratio of net NPA to net advances	-2.073	0.038*
Business per employee (in Rs.lakh)	-1.929	0.054#
Profit per employee (in Rs.lakh)	-2.777	0.005*
Return on assets	-2.127	0.033*
Return on equity	-3.126	0.002*
Ratio of net interest margin to total assets	-1.389	0.165
Ratio of intermediation cost to total assets	-2.516	0.012*
Cash-Deposit ratio	-0.540	0.624
Investment-Deposit ratio	-0.617	0.571

* Significant at 95% Confidence level   and # Significant at 90% Confidence level.

Table 4. The Univariate Logistic regression Model results for the foreign banks.

-2LL	Variable	β	S.E (β)	Wald test	Significance (p value)
17.033	Ratio of net NPA to net advances	0.078	0.040	3.770	0.052*
18.363	Ratio of intermediation cost to total assets	0.814	0.350	5.404	0.020*
22.237	Return on assets	-0.174	0.109	2.535	0.111
21.238	Return on equity	-0.067	0.040	2.721	0.099[#]
18.506	Profit per employee	-0.036	0.018	3.968	0.046*

Significant at 95% Confidence level and # Significant at 90% Confidence level.

Table 5. The Multivariate Logistic regression Model results for the foreign banks.

-2LL	Variable	β	S.E (β)	Wald test	Significance (p value)
10.152	Ratio of net NPA to net advances	0.096	0.055	3.063	0.080#
	Return on equity	0.111	0.116	0.918	0.338
	Profit per employee	-0.086	0.064	1.788	0.181

 # Significant at 90% Confidence level.

Table 6. Correlation matrix of Logistic regression Model coefficients

	Ratio of net NPA to net advances	Return on equity	Profit per employee
Ratio of net NPA to net advances	1		
Return on equity	0.308	1	
Profit per employee	-0.349	-0.940	1

Table 7. Prediction of the Logistic regression Model

Actual	Predicted		Classification Accuracy
	Operating	Closed (Non-Operating)	
Operating	10	2	83.3%
Closed (Non-Operating)	1	7	87.5%
Over all percentage			85.0%