Survival Analysis of Foreign Banks in Pakistan

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Abstract

Purpose. The objective of this paper is to explore the major macroeconomic and financial variables which contribute towards the survival or failure of foreign banks in Pakistan from 1990 to 2015 by applying discrete time logistic survival analysis.

Design/ Methodology/ Approach. Discrete time logistic survival analysis is applied in this paper which highlights the major macroeconomic and financial factors contributing towards the survival or failure of foreign banks in Pakistan.

Findings. The findings of discrete time logit model indicate that all the major macroeconomic variables which are included in this paper i.e. GDP growth rate, Inflation and Exchange rate are found to contribute towards failure of foreign banks in Pakistan. While out of 6 financial ratios only operating expenses to total assets ratio and net advances to total assets ratio are found to contribute towards the survival of foreign banks in Pakistan.

Research Limitations. This research paper could be further extended if continuous time survival analysis is applied through quarterly available data and with a different form of baseline hazard model the results may vary.

Practical Implications. Foreign banks directly or indirectly boost up the economy of the host country. Thus, by highlighting the factors which contribute towards their failure precautions could be taken to control foreign banks failure in Pakistan so that their survival time might be enhanced.

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Originality/ Value. This research paper would be the first practical work which is investing the factors contributing towards the failure or survival of foreign banks in Pakistan.

Key Words. Discrete time logistic survival analysis, Pakistan, Foreign banks, Macroeconomic variables, Financial Variables

1. Introduction

Foreign banks are defined as the banks which operate in other countries by having their branches in those countries and following the regulations of both the home and the host countries. Directly foreign banks bring capital in the host country in the form of investment and capture most of the market by providing standard quality services. While indirectly foreign banks capture customers in the host country by promoting the use of modern technology in the financial sector and encourage domestic banks to provide better quality services by increasing competition in the financial sector along with provision of better quality services at lower cost as supported by (Bilgrami & Fatima ,2012). Bhattacharya and Thakor (1993) presents individual cases of Pakistan, Turkey and Korea where the access to foreign capital is made by capitalized foreign banks in order to fund domestic projects. Although foreign banks are found to indulge in capital flight and sometimes dominating the domestic financial market by beating domestic financial sector through their advanced and better quality services. But irrespective of the cost and benefits of foreign banks, they can stimulate the growth of financial sector of the host country through direct or indirect channels.

Foreign banks are playing their role in the financial development of many developing countries including Pakistan but their role usually depends upon several factors which contributes towards their operation or exist in the host countries or sometimes such banks might merge in the domestic banking sector. This study basically examines the factors which contributes towards the survival of foreign banks in Pakistan. . Operation of foreign banks in Pakistan could create several benefits for our economy for example such banks could provide a platform to merge in the world economy, having investment from abroad, international explore could increase and moreover use of advanced technology in the banking sector could provide improved and better quality services to the customers. For instance, a comprehensive range of banking services including credit cards, retail banking, corporate and investment banking and wealth management are offered to individuals and corporations by Barclays bank in Pakistan.

In 1999, Citibank was the first foreign bank to launch MasterCard in Pakistan and in 2000 it is the first financial institution to launch personal loans in Pakistan. Deutsche Bank was established on 22 July 1961 with named as Deutsche Asiatische Bank although it was later named as Deutsche Bank A.G on 5 April 1988. Deutsche Bank A.G has captured a handsome number of customers by providing quality services to the investors and the individuals due to its regional and international expertise thus it was named the best Bank in The Asset's Triple A Awards 2008. a glimpse on the registration of some major foreign banks in Pakistan is presented in the following table.

Table1.

A Glimpse at Foreign banks entry in Pakistan

Name of Bank	**Registration year**	**No of branches**	**Head office location**
Abn Amro	1948	13	Holland
Al-Baraka (Islamic Bank)	1991	11	Bahrain
Citi Bank	1961	21	USA
Deutsche Bank A.G	1962	02	Germany
Oman International Bank	1979	02	Oman
Bank of Tokya Mitsubishi	1996	01	Japan
Hong Kong and Shanghai Bank	1982	05	Hong Kong
Standard Chartered Bank	1947	116	United Kingdom
Habib Bank A.G Zurich	1967	17	Switzerland
American Express Bank	1972	04	Unites States of America
Industrial and Commercial Bank of China Ltd	2011	02	Beijing

Source. *Determinants of foreign banking activity in Pakistan,* 2012,p.169-170.

Some of these banks are still working in Pakistan for instance Deutche Bank A.G and ICBC are the foreign banks working in Pakistan in 2017 but most of them have either existed or merged in the domestic banking sector. For example, on 30 December 2006 Standard Chartered Bank merged Union Bank with its own subsidiary in Pakistan, the operations of Emirates Bank International were acquired by Union Bank in 2002, Meezan Bank acquired operations of Societie

Gereral in Pakistan, The Royal Bank of Scotland sold out its operations although it was the largest foreign bank in Pakistan having 79 branches across the country.

Iqbal (2013) reported in his article that regarding the case of Pakistan the profit margin of foreign banks is most of the time adversely affected due to several reasons including both the financial factors and some major economic factors. Some of the financial factors which have contributed towards the desperate results on the part of foreign banks in Pakistan are shrinking spread (the difference between the lending and borrowing rates), declining yields on T-bills, non-availability of foreign exchange deposits and disrupted cash flows from the declining repayment ability of the borrowers, declining deposits registration and declining lending rates. But on the other hand, some of the other factors including slow pace of economic development, political instability, foreign currency freezing accounts policy, poor domestic governance, poor law and order situation and exchange rate instability have also worsened the situation by shrinking their deposits base.

Dar (2015) reported that 5 major banks including Allied Bank, Habib Bank, United Bank, National Bank and Muslim Commercial Bank have attained their goal of capturing most of the customers in the country by proving better quality services and expanding their network in the whole country thus making it difficult for the foreign banks to increase their size in the whole country. When exchange rate of Pakistani rupee against the international currencies like US dollar or British pound detoriates, profit margin of foreign banks declines. . For example, due to detoriating macro-economic conditions in the country Societe General decided to close its 4 branches in the country while Meezan Bank acquired the local operations of Societe General in 2002. Similarly in 2015 Meezan Bank have decided to purchase the sole branch of HSBC Oman.

This paper is carried out to find out the average survival time of a foreign bank in Pakistan by exploring some macroeconomic and financial factors which contributes towards their operation or failure. For this purpose statistical technique known as survival analysis is used while Survival analysis basically explains the time to a specific event and that event can be a death, divorce or bank failure. Survival analysis is classified on the basis of time whether the time is treated as continuous or discrete. In this analysis the time to bank failure is measured in year's thus discrete time logistic survival analysis is applied with some major macroeconomic variables including gdp growth rate, inflation rate and exchange rate and 6 major financial ratios of the foreign banks . Data on the financial ratios of foreign banks is collected from the financial statements of foreign

banks from State Bank of Pakistan and for macro-economic variables data is collected from World Development Indicator.

2. Literature Review

Meyer and Pifer (1970) presented the first work on the introduction and development of the bank failure prediction model by using the discriminant analysis for the creation of the bank failure prediction models. The authors concluded that the discriminant analysis used to verify the bankruptcy up to two years provided the reliable results but for a period more than two years it was not reliable to foresee the future failure by using the financial indicators. Thus, other methods were introduced to construct the bank failure prediction models including logistic regression analysis and survival analysis.

The bank failure prediction model developed by using the survival analysis has presented better results for a horizon of two years prior to the insolvency of banks when a comparison was made between the survival analysis and the discriminant analysis. Although a semi parametric technique of survival analysis known as Cox proportional hazards model was applied to estimate the bank failure. (Lane et al, 1986).

Mayes and Stremmel (2012) applied logit model in discrete time survival analysis to predict bank failure in USA on the quarterly base data of Federal Deposit Insurance Cooperation from 1992 to 2012. The authors constricted their model on the risked based and non-risked weighted measure of capital adequacy and concluded that non-risked weighted capital measure along with the adjusted leverage ratio better explains bank failure in USA.

Canicio and Blessing (2014) investigated the causes of bank failure in Zimbabwe during multiple currency regime covering the time period from 2009 to 2012 with the implementation of logit model on fourteen banks. They concluded that GDP growth rate was the only strongest macro-economic variable to have a negative impact on the bank failure in Zimbabwe because inflation is not a problem in the country and exchange rate is not included in the study as Zimbabwe own multiple currencies. Among the financial variables, loan to deposits ratio (LTD), deposits to assets ratio (DTA), return on assets (ROA), efficiency ratio (EFR) and size of the bank are found to influence negatively the chances of bank failure while loan to assets ratio (LTA) was found to have positive influence on bank failure in Zimbabwe.

Lane et al (1986) have done the initial work to predict bank failure by using the survival analysis. They made a sample of 464 banks including 334 successful and 130 failed banks covering

the time period from 1979 to 1983 to predict the bank failure by using a cox proportional hazards model. The predicted values for two years were comparable with the results obtained by using the discriminant analysis but the two year predictions made by using the survival analysis's cox proportional hazards model produced lower type 1 errors. The prediction accuracy of using the cox proportional hazards model of survival analysis was supported when it was applied on some credit unions in Australia and it produced the similar results (Crapp & Stevenson, 1987).

Leung (1997) have applied discrete time logit model to find out the determinants which influence the decisions of foreign banks of having their branches in China. Researcher concluded that foreign banks with sound financial position are found to boost up investment in China while China's restricted capital movement and insufficient legal framework have contributed towards the entry of foreign banks in the domestic banking sector. Arabi (2013) predicted bank failure in Sudan by applying both the logistic regression and the discriminant analysis and concluded that among asset quality, liquidity and capital adequacy, earning on the part of a bank was the most dominant factor to cause bank failure.

No standards are set for the use of the number of the predictor variables thus the choice is simply in the hands of the author. Sales (2005) applied survival analysis irrespective of the time distinction to predict bank failure in Brazil by using a larger set of predictor variables having high ability to predict bankruptcy. Although same results were obtained by Whalen (1991) using the statistical technique of survival analysis to predict the bank failure but the major difference between their analyses was that the number of predictors used by both the authors were different.

Irrespective of the number of explanatory variables most of the work on the bank failure prediction is done in Brazil by applying the Logistic regression analysis by Matias and de Oliveira Siqueira (1996), Araújo (1998), Matias (1999), Alexandre, Canuto and Silveira (2003), Correa et al (2006) and Costa (2007). Araújo (1998) applied logistic regression analysis to predict bank failure in Brazil with capital index and operating expenses as the explanatory variables while both the variables were found to be statistically significant to explain likelihood of bank failure in Brazil.

Laitinen and Luoma (1991) presented the first paper which did not only describe the use of cox proportional hazard model for predicting bank failure but also presents the merits and demerits of using the cox proportional hazard model technique as a bank failure prediction model. By using total 72 businesses including 36 failed finish limited companies and 36 successful

counterparts the accuracy of cox proportional model was empirically compared with the Discriminant analysis and Logit analysis. Than the prediction of failure was made by dividing the businesses into two groups based on their hazard ratio and then businesses with higher hazard ratio were predicted to fail while with lower hazard ratio businesses were predicted to be succeeded.

The techniques were compared and the DA and LA were found superior to the cox model. But Laitinen and Luoma (1991) stated that that the Survival analysis technique was more natural, flexible, and used more information. So the empirical superiority of DA and LA could be due to the small sample size which could be increased to gain an over the traditional models. Although earlier support was given by Keasey et al. (1990) and Ogg (1988) who recommended that Survival Analysis techniques should be used in bank failure prediction.

Kauffman and Wang (2001) illustrated the adequacy of using the survival analysis models to explain the business failure process by examining the derivers behind the survival of internet business by using a data set of consisting quarterly data on 100 internet businesses covering the time period from 1996 to 2001.The non-parametric approach known as Kaplan Meier was used to presents the descriptive analysis and the semi parametric approach was used to explore the relative strength of the six explanatory variables. While both of the approaches present accurate results for predicting the internet business failure process. Shumway (2001) presented the first work on the use of a multi-period logit model to estimate the coefficients of survival analysis model although he only considered the Type 1 error.

Income to assets ratio indicates the return on assets and the profitability of a bank as justified by Bongini et al. (2001), Lanine and Vennet (2006). This ratio indicates the efficiency of the bank management to generate income and the higher the income of the bank the higher the chances for a bank to make further investment and loans to earn more profit. But on the other hand if a bank issues more loan it will damage the credibility of the bank making it unable to meet its liquidity requirements. Thus the influence of the earning factor on the survival or failure of a bank is quite arguable as supported by Taran (2012).The findings by the author suggested that higher profitability of a bank indicates efficient working of the bank management which reduces the chances of bank failure and this argument is supported by Lanine and Vennet (2006) while on the other hand higher earnings on the part of a bank leads towards portfolio risk thus increasing the chances of bank failure and this conclusion is supported by Jordan et al. (2010).

3. METHODOLOGY

Survival analysis is a technique which is used to examine the time to a specific event while the event is defined as death, divorce or birth. In survival analysis the time to an event can be described in days, weeks or months and the dependent variable is the time until the occurrence of a specific event while the covariates may vary over time. Thus, the whole matter of interest is the time to the occurrence of an event in the survival analysis so it is also termed as duration analysis or event history analysis.

3.1. Particular aspects of Survival Analysis

Survival analysis is preferred to linear regression model due to its specific aspects which contributes towards the measurement of the time to an event or survival time. Following are discussed some of the notable attributes of the event history analysis or survival analysis

3.1.1. Durations

Duration is defined as the time during which an activity continues until the event of interest occurs. Allison (1995) concluded that observations with different durations (staggered entry) can be analyzed in survival analysis and this feather is an advantage of this technique. In survival analysis since the time to an event of interest is examined and this act is accomplished on the basis of the durations of the event. One of the reasons of not applying linear regression to model the survival time as a function of explanatory variables is that durations are always positive having a positively skewed distribution while ordinary linear regression remains no more appropriate until this restriction is removed.

3.1.2. Censoring

Kleinbaum and Klein (2012) have explained that censoring occurs when some observations during the study time do not experience the event but might face the event at some unknown time in future. Jenkins, (2008) Observations are termed as censored when the information about their survival time is incomplete thus censoring is a specific type of missing data. Kleinbaum and Klein (2012) provided three accepted justification for censoring which are as following

- An observation do not encounter an event till the end of the study time.
- The observation is lost to pursue.
- People choose to quit when we are working with them.

In either situation the observation will be censored and we can analyze such an observation by applying survival analysis.

3.1.3. Event and censoring times

Each observation is termed as censored or failed on the basis of observation time thus event and censoring times are of crucial importance in duration analysis. The following table explains the difference between event and censoring times and denotes their specific symbol.

Table 3.1

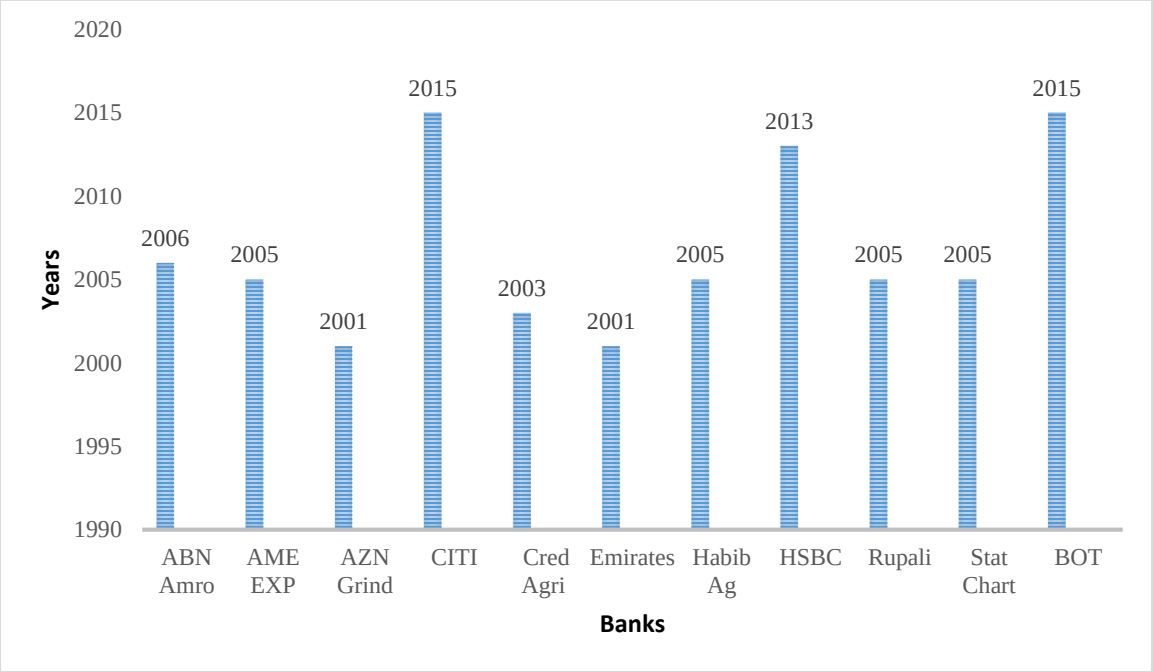
Difference between event times and censoring times

Event time (t_i)	**Censoring time (c_i)**
The time at which a specific event occurs is defined as the event time which is also known as duration time or failure time and it is denoted by T, the random variable as t_i= Event time for individual i.	While the time at which an observation is censored is described as the censoring time indicated by δi where if $\mathbf{c_i}$=1 Uncensored individual. if $\mathbf{c_i}$ =0 Censored individual.

3.2. Recording Discrete Event History Data

Durations, censoring, event and censoring times are important features of survival analysis. The simplest situation of all these is described in the following graph.

Table3.2 *Durations, Censoring, Event and Survival times of different foreign banks*



The above graph repres4ents the survival or failure time of different foreign banks in Pakistan from 1990 to 2015. The X-axis shows the banks name and the Y-axis indicates the time. The table shows that Citi bank and Bank of Tokyo are the censored observations which have not faced the event while all the remaining banks have faced the event although their event timing is different. For example, ABN Amro faced the event in 2006, American Express in 2005, AZN Grindlay in 2001, Cred Agri in 2003, Emirates in 2001, Habib AG Zurich in 2005, HSBC in 2013, Rupali in 2005 and Standard Chartered in 2005. Thus in our model, we expect that each bank can survive until it faces the event or censored. The possibility of the occurrence of an event for each bank can therefore be described by using a dummy variable Y_{ij} as following

Y_{ij} = 1 If A bank *i* faced an event during time period "*j*"

Y_{ij} = 0 If A bank *i* did not face an event during time period "*j*"

If Yij takes on the value of one in every time period, indicating that individual bank I experienced the event of interest at any time during data collection, i.e. data are uncensored. On the other hand, if Yij take on the value of zero in every time period, indicating that individual bank i never experienced failure at any time during data collection was ultimately censored.

A censoring indicator C_i **is** used to check whether each bank ended by the target event or by censoring and it is indicated as following

C_i = 1 If bank *i* is censored → Y_{ij} =1 for *j* = T_i , Y_{ij} = 0 otherwise

C_i = 0 If bank *i* is not censored → Y_{ij} =0 for all *j*.

Let T denote the discrete time interval of the event where T is indexed by using positive integers {1, 2, 3, . . . , J} and Yij represents the binary dependent variable, i.e. if a bank's spell ends in year j or not.Each bank's spell is observed from year one through to the end of the jth year, at which bank i's spell is either complete (ci =1), or right censored (ci =0) (Singer and Willett, 1993; Jenkins, 2004).

3.3. Discrete-time intervals

An event scale can be categorized as either continuous or discrete. If the time units are large, such as months, years, or decades, it is more suitable to use discrete time methods (Jenkins, 2004). Thus, as we have an annual data set, the research deals with events measured or occurring in discrete-time or group-time intervals. In such studies, spell lengths are observed in intervals and indexed by using positive integers, such as 1, 2, 3, . . . , etc. and the observations are summarized discretely rather than continuously.

3.3.1. Discrete Time Logit model or Proportional Odds Model

This model reports coefficients along with the odds ratio in discrete time survival analysis. When we estimate coefficients we use **Logit** and for estimating odds ratio we use **logistic** and regress the independent variables along with the baseline hazard function on the binary dependent variable. A logit model is described as following

$$log\left(\frac{p_{ti}}{1-p_{ti}}\right)=\alpha D_{ti}+\beta x_{ti} \qquad (1)$$

In the above equation

p_{ti} Is the probability of an event during interval t

D_{ti} Is a vector of functions with coefficient α

x_{ti} Is a vector of covariates with coefficient β

αD_{ti} is the baseline hazard with explains the changes in p_{ti} with time and this baseline hazard can be defined in different ways for example as a step function, log of time or polynomial form (Fiona & Elizabeth,2013).

In logistic regression a coefficient βj=1 means that if we change Xj by 1, the log of the odds that Y occurs will go up by 1.Suppose odds ratio (OR) =4 than it can be interpreted as the odds for the group coded as 1 are 4 times more than the odds for the group coded as 0. The logit

model is employed for the discrete time survival analysis because we have a binary dependent variable and this model is dealing with both of the failed and the survived subjects (Greene, 2008).

3.3.2. Discrete time Functions

Kiefer (1988) have described survival analysis in detail by presenting the main concepts of the survival analysis which are the survival function and the hazard function. Thus, the discrete time functions are classified as followings

1. Discrete time hazard function
2. Discrete time Survival function

3.3.2.1 Discrete time hazard function

Discrete time hazard function is given as following

$$p_{ti} = P_r\,(y_{ti} = 1 | y_{t-i}\,, \text{i=0}) \qquad (2)$$

Where p_{ti}a discrete time approximation to the continuous time hazard function hi (t) .Discrete time hazard function denoted by p_{ti} is the probability that individual i has an event during interval t, given that no event has occurred before the start of t.

The conditional failure probability which is often termed as discrete time hazard is given as

$$h\,(t)=P(T=t \mid T\geq t) \qquad (3)$$

But here h (t) is only approximately a rate and if intervals are small only then this approximation is good (Fiona & Elizabeth, 2013).

The hazard function actually explains the probability of experiencing the event over time and how that probability changes with time. However there is a concept to be clarified before the estimation of hazard function: the event of interest, also called failure event, which corresponds to the time when a company or individual no longer remain as they were before. In case f Pakistan the hazard rate of foreign banks have an upward trend and it is calculated in Appendix 1 and graphically the increasing hazard rate is presented in Appendix 2(table 1).

3.3.2.2. Discrete Time Survival Function

The survival function which indicates the probability of survival during a specific time period in discrete time model is explained by Bruderl (2012) as

$$S\,(t)=P(T>t) =\prod_{u=1}^{t}(1 - h(u)) \qquad (4)$$

Kiefer (1988) described the logic of the survival function being P (T>t) rather than P (T = t) is that some observations in the study will not experience the event during our study and thus there time to event is unknown usually called the censored observations**.** The survival rate of foreign banks in Pakistan is decreasing and it is calculated in Appendix 1 and graphically represented in Appendix 2(table 2).

4. DATA AND VARIABLE DESCRIPTION

4.1. Data

In order to analyze the survival of foreign banks in Pakistan we used data of the 6 financial ratios including NITA, NATA, DTA, OETA, NPLTA and NAD of 21 foreign banks along with some major macroeconomic indicators including GDP growth rate annual percentage, inflation GDP deflator and exchange rate rupee per US$ covering the time period from 1990 to 2015. The data of the financial ratios of foreign banks is collected from the financial statements of foreign banks from the annual report of State bank of Pakistan. Data for GDP annual percentage growth rate and inflation as GDP deflator annual percentage growth is collected from World Development Indicator (WDI) while for exchange rate data is collected from Knoema as exchange rate rupee per US $.

4.2. Definition of variables and Measurement

The variables used in this study along with their description are as following

4.2.1. Dependent Variable

4.2.2. Explanatory Variable

4.2.1. Dependent Variable

In discrete time survival analysis of foreign banks in Pakistan the dependent variable is in binary form to categorize failed or survived bank. Thus, the dependent variable is the survival and hazard ratios of foreign banks which takes the binary form as 1 if the bank have experienced the event during a specific time period or have failed and 0 if the bank is censored or have survived or have not faced the event.

4.2.2. Independent variable

The Explanatory variables applied in this study are a combination of financial Ratios of foreign banks and major macroeconomic variables. The financial ratios are calculated by using data on financial variables from the financial statements of the foreign banks.

Independent variables along with their expected signs, descriptions and formulas are explained in the following table.

Table 4.1

Independent Variable	Description	Formula	Expected Sign
GDP growth rate	Gross domestic product	GDP growth rate annual %	-ve
Inflation	Increase in general price level	GDP deflator	+ve
Exchange rate	Value of one currency in relation to another currency	Rupee per US$	+ve
NITA	Net Investment to total assets ration	Net investment/total assets	+ve or –ve
NATA	Net advances to total assets ratio	Net advances/total assets	+ve
DTA	Deposits to total assets ratio	Deposits/total assets	-ve
OETA	Operating expenses to total assets ratio	Operating expenses /total assets	-ve or +ve
NPLTA	Non-performing loans to total assets ratio	Non-performing loans/total assets	+ve
NAD	Net advances to deposits ratio	Net advances/deposits	+ve

1. Gross Domestic Product (GDP) growth rate

Mayes and Stremmel (2012) have presented their work on bank failure in USA by applying the logit model based on the discrete time survival analysis to capture the influence of GDP growth rate on the bank failure using the data from 1992 to 2012.They have concluded a negative relationship between GDP growth rate and bank failure indicating that higher the GDP growth rate

is the less the chances for a bank to fail and vice versa. Thus in our analysis we are expecting a negative relationship between the GDP growth rate and bank failure which indicates that as the GDP growth rate increases there are less chances for banks to fail and vice versa

2. Inflation

Azam and Siddiqui (2012) concluded that foreign bank's profitability is affected by inflation which is associated with both the higher cost and the higher income. The profitability of the bank is expected to be positively related to inflation if bank's income increases more than its cost while a negative relationship will exist if bank's cost increases greater than its income. Thus, in our analysis we are expecting a positive relationship between inflation and bank failure as when there is inflation there are more chances for a foreign bank to fail in Pakistan and vice versa.

3. Exchange rate

Exchange rate is defined as the value of one currency in relation to another currency. Fluctuations in the exchange rate contributes towards the survival or failure of foreign banks in Pakistan. When exchanges rate rises profitability opportunities decreases for foreign banks thus contributes towards their failure. While a decrease in exchange rate raises the profitability opportunities for foreign banks dealing in foreign currency thus contributing towards their survival .So in our analysis we expect a positive relationship between exchange rate and bank failure as exchange rate rises profitability of foreign banks decreases thus leading towards their failure and vice versa.

4. Net Investment to Total Assets Ratio

The NITA ratio is considered as the return on the assets (ROA).If the bank is investing a huge amount out of its assets than it will definitely face liquidity issue. When more amount is invested there is less amount to meet the current requirement of the customers or the sudden financial requirements. Allen and Gale (2004) have presented their work on the role of a bank as a liquidity creator and risk transformer which leads such a bank towards failure because creating more liquidity means the bank is issuing more loans and issuing more loans creates liquidity problem for the bank to meet its liquidity demand thus increasing the chances for the bank failure. Moreover if the return on investment is higher than the bank will invest more out of its assets because it will raise the profitability of the bank. Thus, in our analysis we could expect both a negative and a positive relationship between NITA ratio and bank survival or failure respectively.

5. Net Advances to Total Assets Ratio

This ratio shows the amount of advances which are going to be made out of the total assets of a bank. Wheelock and Wilson (2000) concluded a positive relationship between NATA ratio and the chances of bank failure indicating that the higher this ratio is the more the chances for a bank to fail. Shaffer (2012) found a positive relation between NATA ratio and bank failure which indicates that a higher ratio is associated with more chances of failure on the part of the bank. Arena (2004) empirical investigation concluded that liquidity shocks stimulate bank failures due to the bank inability to meet their short term commitments. So a positive relationship between bank failure and NATA ratio is expected indicating that the higher the NATA ratio the more the chances for a bank to fail and vice versa.

6. Deposits to Total Assets Ratio (DTA)

This ratio indicates the amount of assets which is obtained by the deposits in the bank while the deposit is a liability owned by the bank to the depositors. When deposits of a bank increase it will increase the assets of the bank while the increase in the deposits of a bank shows that the bank have attained the trust of its customers. Than the bank can use these deposits for several purposes to attain profit its profit for example for investment purpose or for making loans .Investment and advances will increase the profitability of the bank and as a result this will further increase its assts. Thus, we are expecting a negative relationship between DTA ratio and the bank failure indicating that the higher the DTA ratio is the less the chances for a bank to fail and vice versa.

7. Operating Expenses to Total Assets Ratio (OETA)

This ratio indicates the amount of operating expenses which the bank is going to meet out of its assets. A foreign bank can capture a large number of customers in a host country by providing better quality services thus, enhancing its chances of survival. While an increase in operating expenses is required to provide these services. So, we can expect a positive relationship between bank survival and operating expenses. DeYoung (2003) indicated that a continuous increase in operating expenses creates liquidity problem for the bank and liquidity shortage leads towards bank failure. Thus in our analysis we are expecting both a positive and a negative relationship between bank failure and OETA ratio.

8. Non-performing Loans to Total Assets Ratio (NPLTA)

This ratio indicates the proportion of NPL's to total assets. NPL is the sum of borrowed money upon which the debtor has not made his scheduled payments for at least 90 days. Oshinsky and Olin (2005) presented a study indicating that banks with riskier assets are more likely to fail than

the banks with less riskier assets because riskier assets always decline the assets of the banks by making the bank recovery uncertain. Oshinsky and Olin (2005), Shaffer (2012) and Babanskiy (2012) concluded that banks with higher level of non-performing loans were more likely to fail because higher level of non-performing loans leads towards deterioration of bank assets thus causing bank failure. Shaffer (2012) concluded that bank failures in US were more likely for the banks with eroding capital base due to higher non-performing loans in 2008 and 1980's. Thus, NPLTA ratio is expected to be positively related to bank failure indicating that the higher the NPLTA ratio is more the chances for a bank to fail.

9. Net Advances to Deposits Ratio (NAD)

This ratio is used to assess the liquidity of a bank because it indicates the amount of advances which are made out of the deposits in the bank. Babanskiy (2010) found that a higher NAD ratio indicates that the bank is more depending on the borrowed funds thus if this ratio is high it will create liquidity problem for the bank in case of any unforeseen event. DeYoung (2003) have concluded that an excessive lending by a bank damages the credibility of a bank making it unable to meet the requirements of its customers and thus leading the bank towards failure. So in our analysis we are expecting a positive relationship between NAD ration and bank failure which indicates that the higher the NAD ratio the higher the chances for a bank to fail and vice versa.

5. ESTIMATION RESULTS DISCUSSION

5.1. Estimation Results of the Logit Model

In discrete time survival analysis logit regression model is implied to estimation the survival of foreign banks in Pakistan. In logit model the description of coefficients is different from the OLS estimates because in case of OLS estimates the dependent variable is continuous while in logistic regression the dependent variable is in binary form(coded as 1 and 0).In logistic regression a coefficient β_j=1 means that if you change the explanatory variable that is x_j by 1, the log of the odds that Y occurs will go up by 1 and in logistic regression the odds ratio(OR) indicates the chances of the occurrence of an event. The following table 5.1 indicates the results from the logit model including the coefficients, significance level and odds ratio.

Table 5.1

Estimation results of the Logit Model (Proportional Odds Model)

Variable Name	Coefficient	Odds Ratio	P Value
GDP growth rate	.6717758	1.957711	0.000
Inflation	.0276851	1.028072	0.093
Exchange rate	.0599285	1.061761	0.000
NITA	.0548941	1.056429	0.907
NATA	-.6922297	.5004589	0.356
DTA	.7584047	2.134868	0.167
OETA	-1.005773	.3657618	0.772
NPLTA	9.529513	13759.89	0.000
NAD	.1850845	1.20332	0.019
Lntime	-.4423819	.6425042	0.000
_cons	-8.873122	.0001401	0.000

Table 5.2

Logistic Regression

Number of observations	5212
LR chi2(12)	375.39
Prob > chi2	0.0000
Pseudo R2	0.2329

5.2. Results discussion of Logit Model

The results from the logit model coincide to our theoretical expectation for some variables including inflation, exchange rate, NITA, NPLTA, NAD and OETA. However some variable contradicted the theoretical expectations including GDP growth rate, NATA and DTA. The explanatory variables along with their coefficients and odds ratio are explained as following

5.2.1. Major Macro-economic Variables

5.2.1.1 GDP growth rate and bank failure

The coefficient of GDP growth rate is .6717758 which indicates a positive relationship between the bank failure and GDP growth rate as opposite to our theoretical expectation. The coefficient of GDP growth rate indicates that for each unit increase in GDP growth rate an increase of .6717758 is expected in the log odds of bank failure. The odds ratio of GDP growth rate is 1.957711 which indicates that the higher the GDP growth rate is there are 1.957711 times more chances for the bank to fail. The significance of GDP growth rate at 1 % and positivity of the variable justifies the result. However a positive relationship between GDP growth rate and bank failure can be justified on the bases that the higher GDP growth rate indicates that the domestic financial sector is strong enough to contribute towards the growth in the economy by providing easy lending thus capturing a huge market share. So, in such a situation it will be challenging for foreign banks to capture a sufficient portion of the market with their tight policies thus reducing their survival.

5.2.1.2. Inflation and bank failure

The coefficient for inflation is .0276851 having the expected positive sign indicating that for each unit increase in inflation the increase of .0276851 is expected in the log odds of bank failure. The odds ratio of inflation is 1.028072 which indicates that the higher the inflation is there are 1.028072 times more chances of foreign bank failure. The coefficient for inflation is statistically significant at 10% level. This conclusion is supported by Azam and Siddiqui (2012).

5.2.1.3 Exchange rate and bank failure

The estimated results for exchange rate are similar to our theoretical expectations. The coefficient for exchange rate is .0599285 indicating that for each unit increase in exchange rate the log odds of failure increases by **.**0599285. The odds ratio associated with exchange rate is 1.035928 indicating that when exchange rate is high there are 1.035928 times more chances for banks to fail. The coefficient for exchange rate is statistically significant at 1% level.

5.2.2. Financial Ratios of Foreign banks

5.2.2.1. NITA Ratio and Bank Failure

The coefficient for NITA ratio is .0548941 indicating that an increase of .0548941 is expected in the log odds of bank failure with a one unit increase in NITA. The odds ratio of 1.056429 indicates that bank with higher NITA ratio foreign banks are 1.056429 times more likely to fail than the banks with lower NTA ratio although the variable is not statistically significant. The positive sigh with NITA ratio justifies our theoretical expectation and is supported by Allen

and Gale (2004) that making more investment creates liquidity problem for the bank thus ultimately contributing towards the failure of a foreign bank.

5.2.2.2. NATA Ratio and Bank Survival

The results of logit model are opposite to our theoretical expectation for NATA ratio. The coefficient for NATA ratio is -.6922297 indicating that with one unit increase in NATA a decrease of .6922297 is expected in the log odds of bank failure. The odds ratio for NATA is .5004589 indicating that bank with higher NATA ratio are .5004589 times less likely to fail than the banks with lower NATA ratio. This result is opposite to the theoretical expectation.

5.2.2.3. DTA Ratio and Bank Failure

In the logit model the coefficient for DTA is positive opposite to our theoretical expectation as .7584047 indicating that the higher the deposits the more the chances for a bank to fail. The odds ratio of 2.134868 for DTA indicates that bank with higher DTA ratio are 2.134868 times more likely to fail than the banks with lower DTA ratio.

5.2.2.4. OETA Ratio and Bank Survival

The coefficient of OETA ratio that is -1.00577 indicating that for each unit increase in OETA ratio of a bank the log odds of the bank failure decreases by 1.005773 and the odds ratio associated with OETA ratio is .3657618 express that the bank with higher OETA ratio is .3657618 times less likely to fail than the bank with lower OETA ratio. The result of the logit model is similar to our theoretical expectation. Dar (2015) supported the idea that foreign banks have to increase their expenditures to capture the domestic market in a host country which ultimately increase their profit opportunity.

5.2.2.5. NPLTA Ratio and Bank Failure

The coefficient for NPLTA is 9.529513 indicating that for each unit increase in NPLTA the log odds of bank failure increases by 9.529513 and it is statistically significant at 1% level of significance while the odds ratio for NPLTA is 13759.89 expressing that a bank with higher NPLTA ratio are 13759.89 times more likely to fail than the bank with lower NPLTA ratio. The results of logit estimation for NPLTA ratio are similar to the theoretical expectation although this ratio have the highest odds ratio indicating that NPLTA ratio is the biggest factor for the failure of a foreign bank in Pakistan. Oshinsky and Olin (2005), Shaffer (2012) and Babanskiy (2012) supported the same results.

5.2.2.6. NAD Ratio and Bank Failure

The coefficient of NAD ratio is .1850845 indicating that the higher the NAD ratio is the more the chances for a foreign bank in Pakistan to fail. This positive relationship is justified because when a bank increases its NAD ratio it will face the liquidity problem for the bank and when a bank is unable to meet the liquidity demands of its customers it will lose its customers and thing will lead towards its failure. Babanskiy (2010) and DeYoung (2003) supported the same results. In case of Pakistan where minority have accounts in foreign banks if the concerned bank faces the liquidity problem it will easily loose its valuable customers and at the end it will fail.

Conclusion

Foreign banks with international expertise influence the financial structure of the host country because with the provision of standard quality services and access to international capital these banks enhance competiveness of domestic banking sector. But working of foreign banks in a host country is influenced by several financial and macroeconomic factors. Sometimes the prevailing financial market conditions of the host country result in the merge of foreign banks in the domestic banking sector or in their exist. Thus, in either case, the impact of foreign banks on the economy of the host country cannot be ignored.

Keeping in view the importance of foreign banks for the financial growth of the host country this study is performed to indicate the major financial ratios and macroeconomic variables which are contributing towards survival or failure of foreign banks in Pakistan. Discrete time logit model is applied on six major financial ratios including NITA, NATA, DTA, OETA, NPLTA and NAD and macroeconomic variables consisting GDP growth rate, Inflation and Exchange rate using the from 1990 to 2015. Data for financial ratios is obtained from the financial statements of foreign banks from the annual report of State Bank of Pakistan and for GDP growth rate and inflation data is acquired from WDI while data for exchange rate is attained from Knoema.

Among the six financial ratios NITA, DTA, NPLTA and NAD are found to contribute towards the failure of foreign banks in Pakistan while NATA ratio and OETA ratio are found to increase the survival of foreign banks in Pakistan. The study indicates that the effect of these financial ratios is strong enough that out of 21 foreign banks from the time period 1990 to 2015 only 4 banks are survived while 17 banks have experienced failure. Surprisingly, GDP growth rate, inflation and exchange rate are resulting in the failure of foreign banks in Pakistan. NPLTA ratio is found to be the strongest financial ratio to result in the failure of foreign banks. Although some variables are not statistically significant but their role in the survival or failure of foreign banks

cannot be ignored. Thus, it is concluded in this study that the role of macroeconomic variables in the failure of foreign banks in Pakistan is stronger than the influence of financial ratios as all macroeconomic variables included in this study are statistically significant. There should be a flexibility in the operating conditions of foreign banks if such banks want to capture a sufficient proportion of the financial market in Pakistan. Moreover, SBP should provide policy recommendations to foreign banks for their efficient operation in Pakistan.

APPENDIX 1

Time	**Number of subjects at risk**	**Events**	**Censored Observations**	**Survival Function S(t)**	**Hazard Function H(t)=1-S(t)**
1990	12	0	12	=12/12 1	0
1991	13	0	13	=13/13*1 =1	0
1992	13	0	13	1	0
1993	13	0	13	1	0
1994	13	0	13	1	0
1995	13	0	13	1	0
1996	14	0	14	1	0
1997	14	0	14	1	0
1998	14	0	14	1	0
1999	14	0	14	1	0
2000	14	0	14	1	0
2001	20	4	16	0.8	0.2
2002	16	2	14	0.7	0.3
2003	14	3	11	0.55	0.45
2004	11	0	11	0.55	0.45
2005	11	4	7	0.35	0.65
2006	7	1	6	0.3	0.7
2007	6	0	6	0.3	0.7
2008	7	0	7	0.3	0.7
2009	7	1	6	0.25	0.75
2010	6	0	6	0.25	0.75
2011	7	0	7	0.25	0.75
2012	7	0	7	0.25	0.75
2013	7	1	6	0.21	0.79
2014	6	2	4	0.14	0.86
2015	4				

APPENDIX 2

Table 1: Discrete time Hazard function h (t)

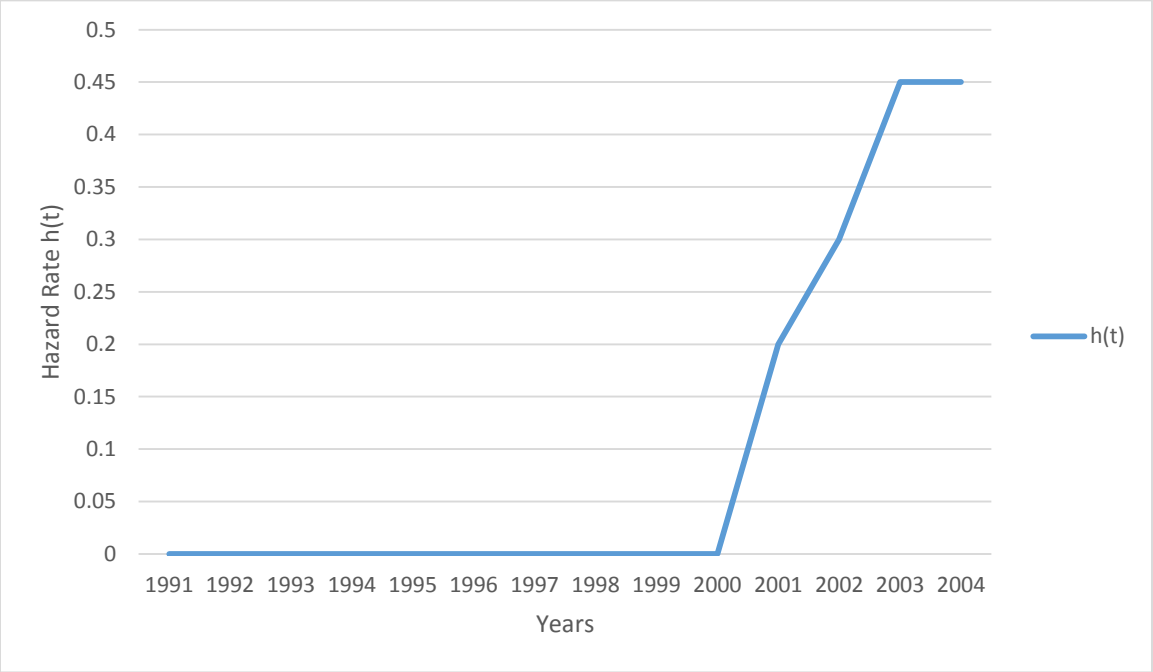
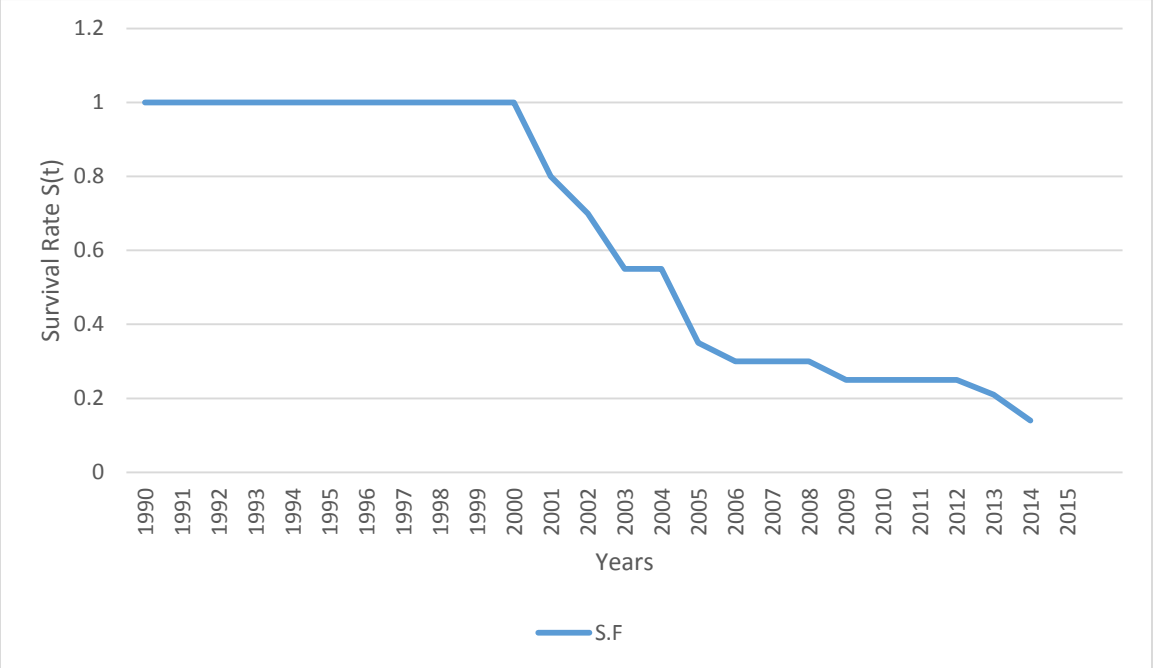


Table 2:

Discrete time Survival function S (t)



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