Determinants of survival in Islamic banks

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First draft - October 2011. This version - December 2011.

Abstract

We examine the determinants of default in conventional and Islamic banks in Middle and Far Eastern countries. Our analysis is based on both accounting and macroeconomic data for the period (1995-2010) with a total of 421 banks from 20 countries. We adopt survival analysis approaches; namely the non-parametric Kaplan-Meier estimator and the semi-parametric Cox proportional hazards model. Our findings show that the hazard profile of Islamic banks is different than conventional banks with the former being about 64% less hazardous. We construct a country hazard opportunity cost which ranks banks according to the optimal operation environment and find that demographics do matter.

JEL Classification: C41; G21; G20.

Keywords: Islamic banks; Survival Analysis; Cox Proportional Hazards; Shared Frailty; Hazard Function.

* *Corresponding author*. e-mail: v.pappas@lancaster.ac.uk. We thank Dr Mehmet Asutay and participants at the 2011 Islamic Finance Summer School (July 2011) at Durham University; Professor Mahmoud Qudah and participants at the PSUT conference, Global Financial Crisis: Lessons and Challenges (July 2011) for useful comments. We acknowledge Professor Rob Crouchley and participants of Lancaster University Management School seminar for their valuable suggestions. We acknowledge financial support from Gulf One Investment Bank, Bahrain.

1 Introduction

Islamic banking industry attracted a lot of attention in the recent years for a number of reasons. Firstly, the increase of Muslim population as well as its increasing desire to have financial instruments that comply with its religious beliefs (Seidel *et al* 2009). Secondly, the high profitability, solvency and asset growth that Islamic banks experienced during the financial crisis increasing the appeal of Islamic investment products (Cihak and Hesse 2010).

Islamic banking promotes ethical investments by prohibiting any involvement in business lines related with alcohol, pork and weapons. Furthermore businesses that their debt is higher than 30% of their total assets are screened out. Sale of debt instruments, derivatives as well as short-sales is forbidden. Equity-based contracts are the main financial products promoted in Islamic banking; however because the industry is still young there is little standardization which usually leads to higher costs. As a consequence Islamic banking is mainly practiced in project financing of big infrastructure projects rather than retail banking. All the aforementioned make Islamic banking a unique product in the financial world.

The purpose of our research is to identify the similarities and differences in the accounting information preceding bank distress in the two bank types. To this aim we use bank-level data (drawn from Bankscope[1]) for 421 banks, with 315 conventional and 106 Islamic, covering 96 failure episodes in 20 countries – Albania, Bahrain, Bangladesh, Brunei, Egypt, Indonesia, Iran, Jordan, Kuwait, Malaysia, Mauritania, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Tunisia, Turkey, UAE, Yemen – over the 1995-2010 period. These are complemented with a set of publicly available macroeconomic variables[2]. We aim at uncovering the features of bank distress in the two bank types and whether there are similarities and/or differences. Moreover, we seek for empirical evidence that verify or contradict that Islamic banks are less fragile than conventional banks.

Most of the existing literature focuses on banking crises episodes in the US and South America.

[1] The Bankscope database, run by Bureau van Dijk (http://www.bvdep.com/en/index.html) contains information on 30,000 banks around the world.

[2] Sources: IMF, The World Bank

However, there is no consensus neither in the data and methodology nor the results. Banking crises can start when a shock hits the economy or because economic agents expect them (Diamond and Dybvig 1983). The shock can be an increase in the interest rate (Mishkin 1999), borrowing and lending currency mismatch (Akerlof and Romer 1993; Drees and Pazarbasioglou 1995)or speculative attack by foreign investors taking advantage of high interest rates and loose monitoring systems in developing countries (Calvo *et al* 1994). There is extensive literature studying factors that can predict bank fragility. Factors can be related to the macroeconomic environment such as real GDP growth or real interest rates (Demirguc and Detragiache 1998)or to the banking sector such as private sector credit/GDP, a proxy for financial liberation (Levine and Zevros 1998; Demirguc-Kunt and Huizinga 2001). There are also studies that look at characteristics of individual banks to identify early warning indicators of banking problems.

In the conventional banking system fixed interest is given on deposits. However returns on investments fluctuate according to the economic cycles. Consequently the conventional banking sector becomes fragile and prone to crisis as pressure to meet the fixed obligations builds up (Diamond and Dybvig 1983; Ali 2004). There has been a lot of theoretical work arguing on why Islamic banking is inherently more stable and enhances economic growth (Haque and Mirakhor 1986; Sundarajan and Errico 2002; Archer and Karim 2007). First, Islamic banks are able to pass through all risks related to their investments to their depositors, which are similar to investment accounts, with no guaranteed return. Secondly, as Islamic banks act as business partners in their financing operations, moral hazard and adverse selection issues are reduced (Harris and Raviv 1991). Moreover, the investment type of deposit accounts shifts part of the monitoring task to the depositors (Cihak and Hesse 2010). Nevertheless, Islamic banks face higher operational risk due to the lack of standardisation of products and procedures forcing them to financing of big scale projects (i.e. real estate, infrastructure). The additional, legal mostly, complexities of Islamic financial products are impediments to Islamic banks' expansion, particularly in the west.

Our model builds on the Cox (1972)PH model. A stratified Cox model is used to allow the

two bank types to have hazards of different shape. In a generalized context we allow for Islamic banks to have different risk profile, given their unique nature, than the conventional banks using stratified Cox models. A shared frailty model is used to allow for omitted variables and unobserved heterogeneity.

The rest of the paper is structured as follows: In section 2 we provide a summary of the relevant literature in banking fragility. Section 3 outlines the survival analysis methodology used and presents the data and their transformations. Empirical analysis and findings are presented and discussed in section 5 and section 6 concludes.

2 Literature Review

Survival analysis has been used extensively in the fields of medicine, biology and engineering (Hosmer and Lemeshow 2008). Its application in the field of economics was pioneered by Lane *et al* (1986)who identify factors related to bank failure in the USA in the period 1979-1984. They find that firm specific characteristics, as they appear in the accounting statements, have significant explanatory power in identifying early warning signals of failure. The vital information about a bank's default likelihood represented in accounting ratios led to the establishment of the CAMEL ratings system. CAMELs are a set of standardised accounting information (reported by banks) according to which regulators and interested parties can get information about the financial soundness of a bank. Gonzalez-Hermosillo *et al* (1997)provide the first case study for Mexico after the currency crisis of 1994. Making use of accounting data they find that higher values of non-performing loans and non-securitised loans are associated with a higher probability of failure. By contrast, they fail to find any statistical significant link between profitability, liquidity and distress. Dabos and Escudero (2004) examine the Argentinean banking system using survival analysis and accounting data finding evidence that increased profitability (RoA) and liquidity (liquid assets/deposits) reduces the hazard of the bank.

Information from accounting statements have been found to be relevant in survival analysis

modelling for firms' likelihood of default (Bartelsman *et al* 2005; Shirata 1998). Macroeconomic factors that also affect the likelihood of failure of a bank have been incorporated in several studies. Demirguc-Kunt and Detragiache (1998)find that weaker macroeconomic environment (low GDP growth, worsening terms of trade, high real interest rates) have a negative effect on the stability of the financial system. Bank concentration upon banking stability is examined in Evrensel (2007), Beck *et al* (2006) and Schaek *et al* (2009)among others. (Sales and Pianto 2007)use accounting and macroeconomic data to study the hazard functions of Brazilean banks in a parametric survival analysis framework.

The study of Cihak and Hesse (2010)is the first one to address the issue of comparing banking fragility profiles for conventional and Islamic banks. In their sample 18 countries with adequate presence of Islamic banks are included. The range covered is 1993-2004 while Islamic banks account for less than one-fifth of the total sample. The methodology, similar to Maechler *et al* (2007), involves regressing the banks' z-score indicator, a measure of how close a bank is to being insolvent, on a set of bank specific and macroeconomic explanatory variables necessary to reflect both the economic events and regulatory or governance issues.

Results indicate that bigger Islamic banks are more likely to fail, which is opposite to what literature has found for conventional banks where size survival affects positively. (Demirguc-Kunt and Detragiache, 1998; Maecher *et al* 2005). The finding is plausibly attributed to the problems faced by Islamic banks due to the lack of standardization in products and procedures. As contracts need to be redesigned and be tailored specifically to each client, operational risk is significant. Moreover larger banks are more likely to be involved in profit-and-loss sharing which is riskier than the non-PLS contracts (e.g. Murabahah, Ijarah) used by small banks. With regards to conventional banking, the authors find small Islamic banks to be less likely to face insolvency than small conventional ones[3]. However when bank size gets bigger, the situation is reversed. The rest of the results comply with the literature with increases in loan-to-assets and cost-to-income ratios

[3]The authors use arbitrarily a cut-off value of $1 billion assets

leading to increased banking fragility.

3 Data and Variables

Data[4] for 421 banks in 20 countries are included in the analysis. The period of study is 1995 – 2010 on annual frequency. The countries included are: Albania, Bahrain, Bangladesh, Brunei, Egypt, Indonesia, Iran, Jordan, Kuwait, Malaysia, Mauritania, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Tunisia, Turkey, UAE and Yemen. The countries are selected so that at least 60% of the population is Muslim so that sufficient data for Islamic banks exist. There are 106 Islamic and 315 banks in the sample while 8 Islamic and 89 conventional banks fail in the study period. A bank is considered as failed when one of the following criteria is met: bankruptcy, dissolution, liquidation, negative net worth and acquisition (Heffernan 2005). Variables from different parts of the accounting statement are included in order to capture separately their effect on banking survival. Hence variables from the balance sheet, the income statement and some widely used financial ratios are included in the analysis.

Given variables from the balance sheet are: *Loans, Total Assets, Other Earning Assets, Reserves for Impaired Loans/Non-Performing Loans, Deposits and Short term funding, Equity, Liabilities and Liquid Assets*. The Income Statement comprises *Net Interest Revenue, Other Operating Income, Net Income and General Administrative Expenses (Overheads)*. All variables of the balance sheet and income statement have been deflated using the appropriate for each country GDP deflator. Financial Ratios are split down to four categories following the CAMEL[5] guideline. Under Capital quality indicators we have *Equity/Total Assets, Equity/Net Loans, Equity/Deposits and Short term funding* and *Equity/Liabilities*. The Assets quality category is represented by *Loan Loss Reserves/Loans, Tier 1 Ratio* and *Z-score*. The Earnings category includes *Net Interest Margin, Return on Average Assets (RoA), Return on Average Equity (RoE), Cost to Income* and *Income Diversity*. Finally, *Net Loans/Total Assets* and *Liquid Assets/Deposits and Short term*

[4] Bankscope for bank data. IMF, The World Bank, S&P for macroeconomic data.
[5] Ratios for the Management subcategory are not included

funding account for the Liquidity category. We also define the following variables:

Income diversity, which is a measure of how diversified a bank's operations are. The higher the income diversity, the more diversified the bank is. According to Cihak and Hesse (2010)it is defined as:

$$ID=1-\frac{Net\ Interest\ Revenue-Other\ Operating\ Income}{Net\ Income} \tag{1}$$

Z-score is a measure of bank fragility which is often found in the literature. Banks with higher values of z-score are considered less prone to insolvency. The most common definition of z-score is, based on the Cihak and Hesse (2010)paper:

$$Z=\frac{\frac{Equity}{Assets}+RoA}{Volatility\ of\ RoA} \tag{2}$$

According to Maechler *et al* (2007), *return on assets (RoA)* should be used on a moving average basis. We implement both approaches but do not report the moving average version as it had a worse fit.

Other transformations include growth rates of all balance sheet and income statement variables and logarithms of variables that did not include negative values assets, like assets, liabilities and other operating income.

Concentration is proxied by the normalized Herfindahl index based on bank's assets. The normalized Herfindahl index takes values between 0 and 1 with 1 representing the case of monopoly. The market share of the banks is calculated based on assets following the majority of the existing literature (Bikker and Haaf 2000; Cihak and Hesse 2010). The normalized Herfindahl index gives lower ranking and is preferred when small sample sizes exist (Busse *et al* 2006).

For the *credit rating score*, due to data limitations, we constructed an indicator variable (strong) taking the value of 1 for the more economic secure economies, that their credit rating score is at least A for at least 5 years, and 0 otherwise. Thus, Bahrain, Kuwait, Malaysia, Qatar, Saudi Arabia, Tunisia and the UAE are considered as strong economies.

Finally a duration variable, necessary for the survival analysis estimation was calculated as:

$$Duration = Establishment\ Year - Current\ Year \tag{3}$$

The role of the variable is to allow for differences inherent in the history of the banks themselves because they have existed for a longer period. The variable is not treated as an explanatory variable as this is not appropriate in survival analysis it is rather used to condition the hazard rates (Evrensel 2008).

3.1 Descriptive Statistics

Table 1 reports the descriptive statistics and t-test results for comparison between conventional and Islamic banks. An initial glance at the data reveals that there are significant differences between the financials of the two bank types. Both types of banks operate within the same regulatory framework and in countries with dual banking environments; hence differences need to be traced to the different business model of Islamic banks.

Islamic banks are smaller on average than conventional banks under all balance sheet variables. The mean asset size for a conventional bank is 4.94 billion USD while for Islamic banks it is 3.65 billion USD. The income statement provides evidence that the two bank types are less different as only two out of the four variables are different at the 99% statistical significance level.

Financial ratios reveal that Islamic banks mantain higher liquidity buffers (i.e. liquid assets/deposits), a result significant at the 99%. All capitalisation ratios are expected to be higher for Islamic banks compared to conventional banks as debt financing is not an option. For instance Equity/Assets and Equity/Liabilities are 21.67 and 47.94 for islamic banks and 10.80 and 15.28 for conventional banks, statistically significant at the 99% significance level. In terms of profitability, Islamic banks have higher returns on assets, at a 99% statistical significance, but conventional banks have higher returns on equity at the 95% significance level. Islamic banks are partners with both entrepreneurs and depositors. Indeed the deposit accounts available in an Islamic bank treat

depositors as preferred stock holders allowing them residual claiming on the bank profits and not offering any capital protection (Pellegrina 2008). Islamic banks use deposits to expand and as a type of leverage, alternative to equity increases or debt issueing in conventional banks (Karim and Ali 1989). This enables the bank to take on higher risk in its projects but at the same time the risk is passed through to depositors whose remuneration is a share ratio tied to the bank's projects rather than being an interest rate as in conventional banks (Olson and Zoubi 2008). It is for this reason that Islamic banks have lower reserves (loan loss reserves/loans) than conventional banks. An additional reason is that Islamic banks are less likely to default although evidence so far is inconclusive (Khamis *et al* 2010)[6].

[Table 1 here]

4 Methodology

We adopt survival analysis methodology to compare and contrast the fragility of the Islamic and conventional bank types. We use the non-parametric version of the Kaplan-Meier (1958) estimator of the survivor function as used in the Mata and Portugal (1992)followed by a log-rank test for the equality of the survivor functions. Subsequently we adopt semi-parametric survival analysis to model the determinants of banking failure for the two bank types. Our model choice indludes the Cox Proportional Hazards (PH) model as used in Gonzalez-Hermosillo *et al* (1997).

As survival analysis assumes that the probability of failure is not constant over time we prefer it to logit models (Männasoo and Mayes 2009). Survival analysis estimates the instantaneous rate of failure (force of mortality or hazard function) subject to time and a set of explanatory variables relating to the subject's history. In-depth information on survival analysis can be found in Kalbfleish and Prentice (2002)and Lancaster (1990).

Let T denote the time to a failure event with $T \in [0, \infty)$. The probability density function, $f(t)$, and cumulative probability function, $F(t)$,are:

[6] In the result section we show that Islamic banks are less hazardous than conventional banks

$$f(t) = -dF(t)/dt \quad (4)$$

$$F(t) = P(T \leq t) \quad (5)$$

However we refer to the survivor function and the hazard function as they have a more convenient interpretation. The survivor function $S(t)$ reports the probability of surviving beyond time t.The hazard function $h(t)$ is the instantaneous rate of failure or in other words, the event will happen in a given interval conditional on the subject having survived to the beginning of that interval (Cleves *et al* 2010).

$$S(t) = 1 - F(t) = P(T > t) \quad (6)$$

$$h(t) = f(t)/S(t) \quad (7)$$

The Cox PH model is a widely used choice of semi-parametric models (Gonzalez-Hermosillo *et al* 1997)and its hazard function is defined as:

$$h_j(t) = h_0(t) \exp(x_j \beta_x) \quad (8)$$

Where $h_0(t)$ is the baseline hazard function which in the case of semi-parametric models is not assumed to follow any distribution. Nevertheless, all subjects are required to have the same baseline hazard function. The explanatory variables (covariates - (β_x)) act multiplicatively on the hazard function and the maximum likelihood estimation procedure returns estimates of the contribution of every covariate upon the hazard that the subject will fail. The choice of explanatory variables is motivated by previous literature which finds that bank specific information reflected in the accounting statements as well as country related macroeconomic variables are significant determinants of banking failure (Sales and Pianto 2005).

The novelty in our approach is the allowance for Islamic banks to have different risk profiles due to their different rules and financial products. Hence we do not restrict the baseline hazard

function to be of the same shape by allowing for two strata in a stratified Cox PH model set-up similar to that of Lunn and McNeil (1995).

We control for unobserved heterogeneity at the country level and get an estimate of the country's contribution to the banks' risk.

A third addition is in the way we include the explanatory variables. We model separately variables from the balance sheet, income statement and financial ratios to compare and contrast their contributions to the hazard functions. In that way we can draw conclusions relating to which part of the accounting statement is more relevant in bank distress.

The Stratified Cox PH model is presented in equation 9 below where i is used to identify groups.

$$h_{ij}(t) = h_{0,i}(t) \exp(x_{ij}\beta_x) \tag{9}$$

A stratified model takes into account the differences of the strata in the profile of their baseline hazard functions, which are allowed to vary freely, and provide a more efficient way when we are not concerned about how explanatory variables affect different groups but we are looking for a single, efficient estimate.

Shared frailty is the equivalent of a random effects model in survival analysis. It is used to correct for unobserved heterogeneity. Unobserved heterogeneity causes increased correlation within a subgroup of observations due to an omitted variable or a latent process. Equation 10 is the Cox PH model with shared frailty:

$$h_{ij}(t) = h_0(t)\alpha_i \exp(x_{ij}\beta_x) \tag{10}$$

Which can also be written as:

$$h_{ij}(t) = h_0(t) \exp(x_{ij}\beta_x + \nu_i) \tag{11}$$

We choose not to mix the variables from the three parts of the accounting statement in order

to compare the information we get from each one of them.

For the balance sheet data, we have four different specifications; i) Cox PH with accounting data; ii) Cox PH with accounting and macroeconomic data; iii) Cox PH with accounting data and random effects; iv) Cox PH with accounting and macroeconomic data and random effects. For every specification we use a stepwise algorithm (with respect to minimise the AIC) and robust standard errors in three settings; a restricted, a semi-restricted and an unrestricted. In the restricted setting we assume that the baseline hazard function is of different level between conventional and Islamic banks but of the same shape. This is achieved by including an indicator variable taking the value 1 for Islamic and 0 for conventional banks. In the semi-restricted setting we allow the baseline hazard function to vary freely for the two bank types and the estimation is done from the pooled sample using a stratified Cox model with two strata, the Islamic and the conventional. In the unrestricted setting we treat conventional and Islamic banks individually by conducting separate estimations. In this way no restrictions are imposed on the shape of the hazard function as in the semi-restricted setting but furthermore the modelling of the two bank types is done irrespective of the other's presence. The procedure is repeated for income statement and financial ratio data. Table 2 provides a summary of the estimated models.

[Table 2 here]

5 Results

Figure 1 presents the empirical survival rates for the two bank types calculated using the Kaplan-Meier estimator. It is observed that Islamic banks have higher survival rate than the conventional banks. The surival rate after 10, 20 and 30 years is 94%, 84% and 77% for conventional banks and 97%, 91% and 86% for Islamic banks respectively. The log-rank test, presented in table 3, provides statistical evidence that the survivor functions of the two bank types are different at the 5% significance level.

[Figure 1 and Table 3 here]

Having verified the difference in the survival rates of the two bank types we focus on the determinants of the hazard rates given by the results of the Cox PH model. Table 4 shows the results of the restricted (first column) and semi-restricted models (second column) for the balance sheet data. The last two columns show the results of fitting the restricted model separately on conventional and Islamic banks[7]. Table 5 shows the results of the unrestricted model for conventional and Islamic banks for balance sheet data. Numbers reported are the estimated coefficients with p-values appearing in brackets. A negative coefficient shows that an increase in the variable will lead to a reduction in the hazard of the bank. The exponentiated coefficient[8], the hazard ratio, shows the increase in the hazard function given a percentage increase in the explanatory variable.

[Tables 4 - 5 here]

The first striking detail is that the maintained explanatory variables in the generalised models (table 4) are different for the conventional and Islamic banks suggestive of differences in their hazard profiles. Islamic banks are about 70% less risky than conventional banks according to balance sheet data and the restricted model. The coefficient of Assets in table 4 is 0.640 for conventional banks and 2.305 for Islamic banks; thus we conclude that large Islamic banks are more likely (about 9 times based on the difference between the hazard ratios) to fail than large conventional banks. Other earning assets have estimates of -0.410 and -0.756 for conventional and Islamic banks suggesting that a rise of 1% in the specific covariate will lead to less risk by 29.53% and 62.93% for conventional and Islamic banks respectively.

Tables 6 and 7 report the same analysis for the income statement data. Income statement variables confirm that Islamic banks are less risky by about 64%. In addition, the generalised model reveals that the survival of conventional banks is affected by both net interest revenue

[7] Actually in this case the restricted and semi-restricted models are the same. Optimization (stepwise) is done at the restricted model only and then the qualified variables fitted to the two bank types.

[8] Not reported in the tables.

and other operating income whereas for the Islamic banks net interest revenue is not significant. Furthermore, the coefficient in other operating income suggests that a rise by 1% will reduce the risk of failure for Islamic banks by about 1.7% whereas for conventional banks it is only 0.2%.

[Tables 6 - 7 here]

Tables 8 and 9 report the analysis for the financial ratios. Islamic banks are verified to be about 64% less risky than conventional banks. In addition, liquidity ratio (net loans/assets) has estimated coefficients 0.033 and -0.048 for conventional and Islamic banks respectively. The different sign is suggestive of an increase in the hazard coming from a 1% increase in the ratio for conventional banks but a decrease in the hazard for Islamic banks. The opposite is true for the capitalization ratio (equity/assets) where higher capitalisation decreases the probability of a conventional bank failing but increases it for Islamic banks. Net interest margin coefficients are estimated to be 0.125 for conventional banks and -0.147 for Islamic banks though not statistically significant for the latter.

[Tables 8 - 9 here]

The fact that large Islamic banks are more hazardous than large conventional banks has been verified by other studies (Cihak and Hesse, 2010). In addition, Islamic banks rely heavily on trade – fee based – contracts avoiding the use of the profit-and-loss sharing ones as indicated by the greater impact of other earning assets upon banking survival. Islamic banking is more regulated in the sense that there are greater restrictions as to where investments can be placed but it is also not yet fully standardised because of the lack of universal rules relating to how the financial products are structure. Indeed most of the financial products an Islamic bank is offering are tailored to the needs of every client thus increasing operational risk. As the bank size increases the bank will tend to be more involved into partnership (profit and loss sharing -PLS) contracts which are riskier than trade (non-PLS e.g Ijara) (Khalil *et al* 2002). Furthermore a large Islamic bank is more likely to have dealings in other countries, especially western economies where legal issues can arise due to

the incompatibility of the western laws with the Islamic law that needs to be recognised (i.e. by a court hearing following a disolution case) for the Islamic banking contracts to be valid.

Reputation and relationship management are high priorities for IBs. Consequently they rely and spend more on human resources compared to conventional banks (Pellegrina 2008). Education and technical expertise in Islamic finance has risen significantly in the past years. Ahmad *et al* (1998) finds that staff members in the IB industy are not sufficiently qualified. By contrast, Johnes, Izzeldin and Pappas (2011) find no significant differences in managerial quality between the two bank types. Hence the negative and statistically significan coefficient of overheads in IBs is explained by the whole human resources development process taking place in the industry. Similar conclusion is found in Olson and Zoubi (2008).

An Islamic bank's portfolio consists of long-term investments which are illiquid, a practice not very consistent with conventional banking standards (Ainley 2002).Liquidity management is very important for Islamic banks for three main reasons. First, with the exception of Malaysia, debt cannot be traded under the Islamic law unless it is backed up by tangible goods (i.e. assets or commodities). In most countries with Islamic banking presence there are provisions allowing Islamic financial institutions to own property[9]. For instance, an Islamic bank cannot borrow, say, $300 million in cash or cash equivalent; it must be the equivalent worth of oil or any other commodity or a building of the same value[10]. Secondly, Islamic banks must not engage in interest-bearing dealings; however there are regulatory requirements that force them to have interest-bearing accounts with the central banks in order to obtain a banking license. Usual ways around this involve donation of any interest income to charity or opting for non-banking status which may impose operational limitations (Grais and Pellegrini 2006). Thirdly, only a few countries have established a Shariah compliant lender of last resort facility (Malaysia and Sudan being a few exceptions) thus forcing Islamic banks to use conventional mechanisms when borrowing from the

[9] On this matter, the banking law of Jordan (28/02) allows Islamic financial institutions to own movable and immovable properties.

[10] There are other complexities that require the bank to own the commodity or asset before selling it which makes liquidity management difficult.

central bank. With Shariah compliant secondary markets still at infancy stage[11], Islamic banks are maintaining higher levels of liquidity than conventional banks as verified by the descriptive statistics and argued elsewhere (Iqbal and Mirakhor 2007). Higher liquidity does not hamper IBs efficiency so it is rather a deliberate managerial choice rather than lack of investment opportunities (Pellegrina 2008). Indeed, higher liquidity, represented by Net loans/assets, by 1% leads to 3.92% lower risk whereas for a conventional bank, to which interbank lending facilities are in place, the same increase will lead to 3.35% more risk due to forgoing investment opportunities.

Capitalisation ratio equity/assets, the inverse of leverage, reveals an important finding. A better capitalised (or lower leveraged) by 1% conventional bank will decrease its risk by 4.71%; on the contrary, a better capitalised (or lower leveraged) by 1% Islamic bank will increase its risk by 7.36%. Islamic banks have higher capitalisation than conventional banks as verified in the descriptive statistics (21.67 against 10.80). Indeed, higher capitalisation means lower leverage which is one of the cornerstones of Islamic finance. The majority of Islamic banks are small, compared to conventional banking standards. They have less diversified portfolios and they need to withhold more capital to outweigh their exposure to risk especially given the liquidity issues they are subject to (Bashir 1999). In addition, as Islamic banks do not offer deposit insurance schemes, higher capitalisation serves as indication to depositors as to which bank is safer (Galloway, Lee and Roden 1997; Kahane 1977). Moreover, in some states there is a close connection between the royal family and the Islamic banking system, which can also explain the higher levels of capitalisation.

The estimated coefficients suggest that the conventional system is over-leveraged; thus better capitalisation will decrease the probability of default. By contrast, Islamic banks are over-capitalised (or under-leveraged). Hence any further increase of capitalisation for Islamic banks leads to higher hazard due to the bank foregoing investment opportunites. The finding is not supportive of Pellegrina (2008) who suggests that higher leverage of IBs would put provide an in-

[11] The International Islamic Financial Market (IIFM), sponsored by several regulators, and the Liquidity Management Center (LMC), an initiative between Dubai Islamic Bank, Bahrain Islamic Bank and Kuwait Finance, are two initiatives to create an active Shariah compliant secondary market.

centive (and pressure) on managers for better performance. However the issue is related to the IB conduct of business rather than any managerial inadequacies suggested by Pellegrina (2008). On this ground, Johnes, Izzeldin and Pappas (2011), find that the IB type is inefficient as it prevents the banks from operating at the optimal leverage level (in terms of contribution to the hazard function).

Islamic banks tend to use fee-based contracts rather than profit-and-loss sharing contracts which ensure that the bank does not commit its capital for a long period of time (Khalil *et al* 2002). Another reason for Islamic banks shying away from these contracts is the moral hazard problems and the cost of eliminating them in practice (Iqbal and Llewellyn 2002). Net interest margin shows the profit margin of a bank's traditional activity (i.e borrowing at a low interest rate and lending at a higher one)[12]. It can be seen that an increase of NIM by 1% will increase the hazard faced by conventional banks by 13.31%. By contrast, Islamic banks will benefit from a 15.83% reduction in their hazard.

Table 10 presents the balance sheet results for the semi-restricted models with macroeconomic variables (the first four columns), and the unrestricted models with macroeconomic variables for conventional banks and Islamic banks separately (last eight columns). Estimated coefficients are reported and the p-values are in parenthesis. Tables 11 and 12 present the same analysis using income statement and financial ratio data.

[Tables 10 - 12 here]

Observing at the results we see that real GDP growth affects primarily Islamic banks under all data specifications. The negative coefficient suggests that a 1% rise in real GDP growth leads to about 32% lower risk according to the balance sheet data and is consistent across the other specifications as well. For conventional banks however real GDP growth is not statistically significant. Inflation affects both bank types. The p-values suggest that inflation is a significant determinant

[12]Islamic banks do not offer interest but share ratios, however the principle holds. Deposit accounts offer a low share ratio (of the bank's profits). Bank charges a higher share ratio when it takes part in a venture (i.e. giving loan).

of a bank's hazard profile; however the estimated coefficients suggest that Islamic banks are more affected by changes in inflation. For instance a rise by 1% in inflation increases the hazard probability by 5.3% as opposed to 1% for conventional banks when balance sheet data are used. The finding is consistent with the other two datasets as well. Concentration is significant in explaining conventional bank fragility only under all three datasets.

Macroeconomic environment is found to affect conventional banks as previous literature suggests (Demirguc-Kunt and Detragiache 1998). However the two banking systems are affected to a different extent by it. Most notable is the significance of concentration for conventional banks which is attributed to the East Asian crisis that hit Malaysia and Indonesia causing a wave of mergers and acquisitions (Schaeck *et al* 2009). In our sample, theses countries are among those with the lowest concentration and they jointly experienced 49 bank failures. This has been verified elsewhere and should not be surprising given the fact that most of the failures in the conventional banks examined occurred due to mergers and acquisitions

Table 13 presents the balance sheet results for the estimation accounting for unobserved heterogeneity. The first two columns repeat the unrestricted and semi-restricted models for comparison purposes while the third and the fourth present the unrestricted model with random effects (according to bank type and country respectively). The table reports the estimated coefficients and their p-values are given in parenthesis. Tables 14 and 15 show the same analysis for the income statement and financial ratios.data. Estimates of the random effect for every country are presented in table 16.

[Tables 13-16 and Figure 2 here]

The statistical significance of the random effects component when the group is identified according to the country suggests that Islamic banks are less hazardous than conventional banks across all data specifications. According to it, Islamic banks are about 65% less hazardous using balance sheet data, a finding which is inline with the previous analysis. The fact that the country

groupings show to have significant intra-group correlation, evident by the statistical significance of the theta parameter (θ), leads us to conclude that there is a country effect which increases or decreases the hazard rate faced by a bank and is applicable for all countries in the sample. The numbers in table 16 show the additional risk a bank is facing by operating in a given country. All other characteristics being equal, a conventional bank operating in Jordan would have a 76.82% reduction in its total risk as a country effect, compared to the base level. By contrast, an Islamic bank in Brunei will be subject to an additional risk of 35.79% compared to the base level.

Table 17 presents the balance sheet results for the estimation accounting for unobserved heterogeneity according to country taking into account the macroeconomic environment. The table reports the estimated coefficients and their p-values are given in parenthesis. The first four columns show the results for both bank types while the last eight are equally split between conventional and Islamic banks. Tables 18 and 19 show the same analysis for the income statement and financial ratios.

[Table 17 - 19 here]

The country factor captured by the estimates of unobserved heterogeneity remains statistically significant when the model is enhanced with macroeconomic variables (Tables 17 – 19). However it is significant only for the conventional banks. The finding is attributed to the Islamic banks maintaining a less uniform and standardised character. Another reason is the diversified portfolio of each bank being exposed to different risks and projects making Islamic banks behave more like private banks. Estimation of the unobserved heterogeneity is repeated for the macroeconomic models. Results[13] show that the rankings of the countries remain almost unchanged from the original frailty model with Jordan and Tunisia having the most favourable banking environment whereas Turkey and Brunei have the least. For Islamic banks in particular the most favourable environment is found in Malaysia, Kuwait and the UAE; conversely the worst is found in Bangladesh, Brunei and Turkey.

[13] Available upon request.

6 Conclusion

In this study we use survival analysis models for conventional and Islamic banks from 20 countries in the Middle and Far East. The data used comprise subsets of the accounting statement and macroeconomic data. Whereas the same categories of accounting information is presented for both bank types, changes in specific variables impact differently upon conventional and Islamic banks.

Increasing bank size (measured by assets) reduces the hazard of a conventional bank failure; however it has the opposite effect on Islamic banks. Liquidity management is a major concern in Islamic banks mainly due to their operating restrictions; hence higher liquidity decreases the likelihood of default. By contrast, for conventional banks, to whom interbank lending is unrestricted and developed; a rise in liquidity is a sign of forgone investment opportunities and is reflected by a rise in the hazard. Higher capitalisation decreases the hazard faced by conventional banks but increases it for Islamic banks. As Islamic banks operate with lower leverage than conventional banks, the finding is suggestive of the Islamic banking industry being less efficient as a model given that it would benefit, in hazard terms, by a rise in leverage (Johnes, Izzeldin and Pappas 2011). Despite this inefficiency, an Islamic bank is found to be about 65% less risky than a conventional bank with the same characteristics. Due to the Islamic banks having to invest in tangible goods (commodities, real estate) they are affected to a greater degree by the macroeconomic environment (real GDP growth, inflation) than conventional banks. Islamic banks are found not to be as dependent on the performance of other banks of the same type as conventional banks. This is attributed to the formers lower standardisation. Tunisia and Jordan have the most favourable banking environment while Turkey and Brunei the leas

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Table Appendix

Table 1

Descriptive Statistics of Explanatory Variables.

	Mean			SD			Median			Skewness		
	CB	**IB**	**All**	**CB**	**IB**	**All**	**CB**	**IB**	**All**	**CB**	**IB**	**All**
Balance Sheet												
Assets	4941	3650***	4681	9776	7175	9325	1172	1004	1139	3.89	3.64	3.94
Equity	482	400***	466	1086	776	1032	106	139	113	4.35	4.81	4.48
Liabilities	4458	3250***	4215	8791	6576	8405	1071	818	1017	3.87	3.64	3.92
Loans	5021	2106**	2383	5021	4269	4882	577	480	553	4.23	3.66	4.18
Deposits	3995	2782***	3754	7826	5480	7435	950	713	894	3.76	3.63	3.85
Other Earning Assets	1847	1002***	1679	4103	1967	3789	339	285	325	4.67	3.60	4.94
Reserves for Impaired Loans/NPL	156	114***	150	322	280	316	40	29	38	4.92	5.40	4.99
Liquid Assets	1286	867***	1202	2519	1805	2398	284	207	261	3.63	3.82	3.73
Income Statement												
Net Interest Revenue	155.90	103.63***	145.51	404.69	250.69	379.65	29.52	24.01	28.40	6.48	3.94	6.56
Other Operating Income	71.08	64.31	69.73	310.72	164.35	287.62	16.28	11.47	15.29	16.77	5.68	17.16
Net Income	-0.53	-0.25	-0.47	28.87	5.54	26.01	0.17	0.23	0.18	-14.21	-9.86	-15.66
Overheads	111.28	84.64***	105.94	351.80	184.53	325.36	24.60	21.07	23.51	13.50	5.42	13.87
Financial Ratios												
Zscore	15.55	22.86***	17.02	26.23	69.95	39.23	11.32	12.54	11.63	16.45	18.84	25.56
Tier 1 Ratio	15.84	25.01***	17.22	17.40	31.19	20.34	12.90	17.05	13.30	5.50	4.65	5.72
Loan Loss Res/Loans	7.88	6.68***	7.69	8.98	10.12	9.18	4.60	3.90	4.48	2.75	5.17	3.24
Equity/Assets	10.80	21.67***	12.99	11.43	22.68	15.05	9.32	13.52	9.73	-0.05	1.95	1.94
Equity/Net Loans	27.67	68.23***	35.49	49.46	124.62	72.28	18.17	25.84	18.93	7.46	3.77	6.33
Equity/Deposits	18.08	55.06***	25.29	49.24	120.14	70.55	11.42	17.78	11.83	10.96	4.33	7.78
Equity/Liabilities	15.28	47.94***	21.73	39.41	117.39	64.27	10.34	15.04	10.76	14.25	4.88	9.23
Net Interest Margin	4.08	6.55***	4.57	4.24	22.80	10.86	3.46	3.57	3.47	1.73	14.24	26.52
RoA	0.94	2.12***	1.17	5.50	5.05	5.43	1.31	1.45	1.33	-10.20	1.13	-8.29
RoE	14.09	11.25**	13.52	47.77	28.12	44.53	13.84	10.91	13.25	2.60	-11.44	2.00
Income Diversity	-5.43	-4.10	-5.17	66.71	19.97	60.48	-0.24	-0.44	-0.28	-33.54	-10.44	-36.28
Cost/Income Ratio	56.47	62.61**	57.66	53.60	64.74	55.97	47.39	50.72	47.93	8.40	7.43	8.19
Net Loans/Assets	51.52	49.81**	51.18	17.47	23.74	18.89	53.78	53.17	53.70	-0.51	-0.41	-0.52
Liquid Assets/Deposits	40.28	55.56***	43.29	42.22	92.79	56.22	31.18	34.79	32.00	9.53	5.91	8.74

Note: All values (except Financial Ratios) are in millions USD; **, ***=significance at the 5% and 1% respectively

Table 2

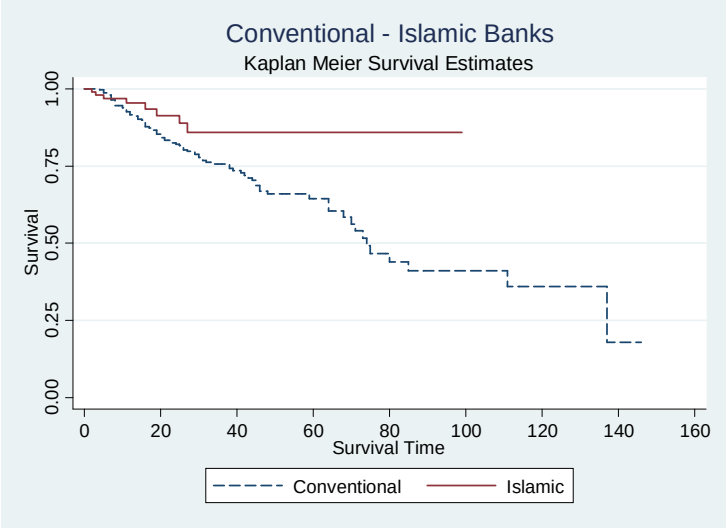
Summary of models, settings and specifications

	Model 1	**Model 2**	**Model 3**	**Model 4**
Restricted Spec	BHF: Same shape, different levels between IB/CB			
Methodology	Cox PH	Cox PH	Cox PH+RE	Cox PH+RE
Data	AS	AS+Macro	AS	AS+Macro
Sample	All	All	All	All
Semi-Restricted Spec	BHF: Different shape, different levels between IB/CB			
Methodology	Cox PH	Cox PH	Cox PH+RE	Cox PH+RE
Data	AS	AS+Macro	AS	AS+Macro
Sample	All	All	All	All
Unrestricted Spec	BHF: Different shape, different levels between IB/CB			
Methodology	Cox PH	Cox PH	Cox PH+RE	All+RE
Data	AS	AS+Macro	AS	AS+Macro
Sample	IB/CB	IB/CB	IB/CB	IB/CB

Notes: BHF=Baseline Hazard Function;IB=Islamic Banks;CB=Conventional banks;All=All banks AS=Accounting Statement; Macro=Macroeconomic Variables; RE=Random Effects. All models are estimated within a stepwise regression framework (minimise AIC) and robust standard errors. Three models are estimated every time; one for every part of the accounting statement (balance sheet, income statement, financial ratios).

Figure 1

Non Parametric Analysis by Bank Type



The surival rate after 10, 20 and 30 years is 94%, 84%, 77% for conventional banks and 97%, 91%, 86% for Islamic banks respectively.

Table 3

Log-rank test for equality of survival functions

Bank Type	**Log-rank test**	
	Events Observed	**Events Expected**
Conventional	89	82.11
Islamic	8	14.89
Total	97	97.00
$\boldsymbol{\chi^2_1}$ **value**	3.87	
$\mathbf{p-value}$	*(0.049)*	

Note: Null hypothesis is the equality of the survivor functions.

Table 4

Cox PH Results - Balance Sheet - Restricted and Semi-restricted models.

	ALL-BS	ALL-BS-S	CB-BS	IB-BS
Assets	0.638	0.649	0.610	0.813
(p-value)	*(0.000)*	*(0.000)*	*(0.001)*	*(0.007)*
Growth of Assets	-9.407	-9.132	-9.328	-8.220
(p-value)	*(0.000)*	*(0.000)*	*(0.001)*	*(0.177)*
Growth of Equity	-0.102	-0.115	-0.114	-0.216
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.651)*
Liquid Assets	-0.001	-0.001	-0.001	-0.001
(p-value)	*(0.003)*	*(0.004)*	*(0.007)*	*(0.179)*
Other Earning Assets	-0.390	-0.386	-0.350	-0.463
(p-value)	*(0.003)*	*(0.002)*	*(0.038)*	*(0.014)*
Islamic	-1.207	–	–	–
(p-value)	*(0.002)*			
No. of subjects	419	419	315	104
No. of failures	96	96	89	7
No. of obs	4155	4155	3345	810
Wald χ^2	79.70	72.47	64.62	11.09
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.049)*
AIC	711.82	665.61	626.62	48.72

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; BS=Balance Sheet

S=Stratified. Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion

Wald test for the joint significance of all explanatory variables.

Assets and *Other Earning Assets* are in logs

Table 5

Cox PH Results - Balance Sheet - Generalised Models.

	CB-BS1	IB-BS1
Growth of Loans	-1.595	–
(p-value)	*(0.002)*	
Loans	–	-0.003
(p-value)		*(0.013)*
Growth of Equity	-0.108	–
(p-value)	*(0.000)*	
Liquid Assets	-0.001	–
(p-value)	*(0.011)*	
Other Earning Assets	-0.410	-0.756
(p-value)	*(0.009)*	*(0.000)*
Assets	0.640	2.305
(p-value)	*(0.000)*	*(0.000)*
Growth of Assets	–	-13.739
(p-value)		*(0.018)*
No. of subjects	315	100
No. of failures	89	7
No. of obs	3340	800
Wald χ^2	57.93	18.99
(p-value)	*(0.000)*	*(0.001)*
AIC	622.65	38.83

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; BS=Balance Sheet

Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion

Wald test for the joint significance of all explanatory variables.

Assets and *Other Earning Assets* are in logs

Table 6

Cox PH Results - Income Statement - Restricted and Semi-restricted models.

	ALL-IS	ALL-IS-S	CB-IS	IB-IS
Growth of Overheads	-0.087	-0.085	-0.074	-0.947
(p-value)	*(0.036)*	*(0.041)*	*(0.077)*	*(0.002)*
Net Income	0.007	0.006	0.006	-0.166
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.005)*
Net Interest Revenue	-0.002	-0.002	-0.002	-0.012
(p-value)	*(0.008)*	*(0.006)*	*(0.009)*	*(0.373)*
Other Operating Income	-0.002	-0.002	-0.002	-0.011
(p-value)	*(0.016)*	*(0.035)*	*(0.040)*	*(0.385)*
Islamic	-1.025	–	–	–
(p-value)	*(0.009)*			
No. of subjects	418	418	315	103
No. of failures	91	91	84	7
No. of obs	4089	4089	3308	781
Wald χ^2	36.53	24.27	25.75	42.20
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
AIC	712.19	666.71	624.13	42.01

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; IS=Income Statement
S=Stratified. Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion
Wald test for the joint significance of all explanatory variables.

Table 7

Cox PH Results - Income Statement - Generalised Models.

	CB-IS1	IB-IS1
Growth of Overheads	-0.074	-0.969
(p-value)	*(0.077)*	*(0.002)*
Net Income	0.006	-0.194
(p-value)	*(0.000)*	*(0.000)*
Net Interest Revenue	-0.002	–
(p-value)	*(0.009)*	
Other Operating Income	-0.002	-0.017
(p-value)	*(0.040)*	*(0.025)*
No. of subjects	315	104
No. of failures	84	7
No. of obs	3308	793
Wald χ^2	25.75	21.04
(p-value)	*(0.000)*	*(0.000)*
AIC	624.13	40.88

Note: CB=Conventional banks; IB=Islamic banks; IS=Income Statement

Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion

Wald test for the joint significance of all explanatory variables.

Table 8

Cox PH Results - Financial Ratios - Restricted and Semi-restricted models.

	ALL-FR	ALL-FR-S	CB-FR	IB-FR
Z score	0.004	0.003	0.004	0.001
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.750)*
ROA	-0.025	-0.026	-0.026	-0.127
(p-value)	*(0.055)*	*(0.051)*	*(0.055)*	*(0.373)*
CTI	0.003	0.004	0.004	-0.013
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.473)*
Net Loans/Assets	0.015	0.015	0.018	-0.015
(p-value)	*(0.046)*	*(0.042)*	*(0.026)*	*(0.355)*
Islamic	-1.021	–	–	–
(p-value)	*(0.033)*			
No. of subjects	415	415	315	100
No. of failures	87	87	82	5
No. of obs	4476	4476	3624	852
Wald χ^2	51.91	50.40	49.08	4.52
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.341)*
AIC	878.08	839.79	798.59	46.39

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; FR=Financial Ratios S=Stratified. Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion Wald test for the joint significance of all explanatory variables.

Table 9

Cox PH Results - Financial Ratios - Generalised Models.

	CB-FR	IB-FR
Z score	0.007	-0.003
(p-value)	*(0.000)*	*(0.094)*
ROA	–	-0.300
(p-value)		*(0.121)*
CTI	0.004	-0.001
(p-value)	*(0.000)*	*(0.970)*
Net Loans/Assets	0.033	-0.040
(p-value)	*(0.000)*	*(0.048)*
Equity/Assets	-0.046	0.071
(p-value)	*(0.000)*	*(0.000)*
NIM	0.125	-0.147
(p-value)	*(0.000)*	*(0.247)*
Income Diversity	-0.001	-0.013
(p-value)	*(0.128)*	*(0.168)*
Liquid Assets/Deposits	0.005	-0.023
(p-value)	*(0.003)*	*(0.389)*
No. of subjects	315	99
No. of failures	82	5
No. of obs	3624	755
Wald χ^2	91.98	37.59
(p-value)	*(0.000)*	*(0.000)*
AIC	578.44	38.77

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; FR=Financial Ratios S=Stratified. Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion Wald test for the joint significance of all explanatory variables.

Table 10

Macro Cox PH Results - Balance Sheet.

	ALL	**ALL**	**ALL**	**ALL**	**CB**	**CB**	**CB**	**CB**	**IB**	**IB**	**IB**	**IB**
	BS1-SM	**BS2-SM**	**BS4-SM**	**BS5-SM**	**BS1-M**	**BS2-M**	**BS4-M**	**BS5-M**	**BS1-M**	**BS2-M**	**BS4-M**	**BS5-M**
Loans	–	–	–	–	–	–	–	–	-0.004	-0.003	-0.003	-0.003
(p-value)									*(0.001)*	*(0.000)*	*(0.017)*	*(0.012)*
Growth of Loans	–	–	–	–	-1.821	-1.462	-1.521	-1.614	–	–	–	–
(p-value)					*(0.002)*	*(0.005)*	*(0.003)*	*(0.002)*				
Growth of Equity	-0.119	-0.108	-0.115	-0.113	-0.116	-0.103	-0.110	-0.105	–	–	–	–
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*				
Liquid Assets	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	–	–	–	–
(p-value)	*(0.003)*	*(0.005)*	*(0.005)*	*(0.003)*	*(0.012)*	*(0.014)*	*(0.015)*	*(0.011)*				
Other Earning Assets	-0.390	-0.413	-0.334	-0.393	-0.420	-0.436	-0.333	-0.437	-0.922	-0.749	-0.768	-0.736
(p-value)	*(0.002)*	*(0.001)*	*(0.010)*	*(0.001)*	*(0.007)*	*(0.006)*	*(0.056)*	*(0.005)*	*(0.002)*	*(0.000)*	*(0.000)*	*(0.000)*
Assets	0.654	0.661	0.549	0.693	0.646	0.652	0.515	0.705	2.720	2.196	2.339	2.288
(p-value)	*(0.000)*	*(0.000)*	*(0.001)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.006)*	*(0.000)*	*(0.001)*	*(0.000)*	*(0.000)*	*(0.000)*
Growth of Assets	-9.748	-8.270	-8.690	-9.177	–	–	–	–	-18.679	-13.563	-13.872	-13.508
(p-value)	*(0.000)*	*(0.001)*	*(0.001)*	*(0.000)*					*(0.145)*	*(0.016)*	*(0.023)*	*(0.019)*
Growth of GDP	0.023	–	–	–	0.044	–	–	–	-0.398	–	–	–
(p-value)	*(0.383)*				*(0.131)*				*(0.001)*			
Inflation	–	0.011	–	–	–	0.010	–	–	–	0.052	–	–
(p-value)		*(0.004)*				*(0.014)*				*(0.000)*		
Concentration	–	–	-3.822	–	–	–	-5.116	–	–	–	1.897	–
(p-value)			*(0.028)*				*(0.021)*				*(0.613)*	
Strong	–	–	–	-0.376	–	–	–	-0.431	–	–	–	-0.127
(p-value)				*(0.169)*				*(0.133)*				*(0.896)*
No. of subjects	419	419	419	419	315	315	315	315	100	100	100	100
No. of failures	96	96	96	96	89	89	89	89	7	7	7	7
No. of obs	4155	4155	4155	4155	3332	3332	3332	3332	792	792	792	792
Wald χ^2	74.86	72.29	78.32	71.85	61.98	59.61	62.91	56.77	40.67	38.43	24.52	22.42
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
AIC	666.92	661.98	662.60	665.73	622.29	620.48	617.88	622.43	32.01	37.86	40.58	40.73

Note: ALL=All banks; CB=Conventional Banks; IB=Islamic Banks; S=Stratified Model; M=Macro Model; BS=Balance Sheet Data IS=Income Statement Data; FR=Financial Ratios. Estimated coefficients and p-values in brackets AIC=Akaike Information Criterion Wald test for the joint significance of all explanatory variables.

Table 11

Macro Cox PH Results: - Income Statement.

	ALL	**ALL**	**ALL**	**ALL**	**CB**	**CB**	**CB**	**CB**	**IB**	**IB**	**IB**	**IB**
	IS1-SM	**IS2-SM**	**IS4-SM**	**IS5-SM**	**IS1-M**	**IS2-M**	**IS4-M**	**IS5-M**	**IS1-M**	**IS2-M**	**IS4-M**	**IS5-M**
Growth of Overheads	-0.083	-0.088	-0.088	-0.085	-0.073	-0.077	-0.077	-0.073	-1.181	-0.927	-0.958	-0.976
(p-value)	*(0.048)*	*(0.035)*	*(0.034)*	*(0.043)*	*(0.081)*	*(0.063)*	*(0.069)*	*(0.078)*	*(0.003)*	*(0.007)*	*(0.008)*	*(0.003)*
Net Income	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	-0.239	-0.202	-0.195	-0.210
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.002)*	*(0.000)*	*(0.000)*	*(0.000)*
Net Interest Revenue	-0.002	-0.002	-0.002	-0.002	-0.002	-0.001	-0.002	-0.001	–	–	–	–
(p-value)	*(0.005)*	*(0.006)*	*(0.002)*	*(0.009)*	*(0.009)*	*(0.009)*	*(0.003)*	*(0.013)*				
Other Operating Income	-0.002	-0.001	-0.002	-0.002	-0.002	-0.001	-0.002	-0.002	-0.028	-0.014	-0.017	-0.015
(p-value)	*(0.046)*	*(0.159)*	*(0.079)*	*(0.042)*	*(0.046)*	*(0.178)*	*(0.109)*	*(0.048)*	*(0.083)*	*(0.011)*	*(0.052)*	*(0.022)*
Growth of GDP	-0.014	–	–	–	-0.003	–	–	–	-0.317	–	–	–
(p-value)	*(0.542)*				*(0.907)*				*(0.010)*			
Inflation	–	0.014	–	–	–	0.014	–	–	–	0.039	–	–
(p-value)		*(0.000)*				*(0.000)*				*(0.026)*		
Concentration	–	–	-6.199	–	–	–	-7.846	–	–	–	-0.515	–
(p-value)			*(0.002)*				*(0.003)*				*(0.928)*	
Strong	–	–	–	-0.237	–	–	–	-0.233	–	–	–	-0.632
(p-value)				*(0.378)*				*(0.419)*				*(0.362)*
No. of subjects	418	418	418	418	315	315	315	315	104	104	104	104
No. of failures	91	91	91	91	84	84	84	84	7	7	7	7
No. of obs	4089	4089	4089	4089	3308	3308	3308	3308	793	793	793	793
Wald χ^2	25.77	46.33	34.39	26.01	26.24	47.03	34.58	27.35	11.80	25.78	27.15	21.30
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.0189)*	*(0.000)*	*(0.000)*	*(0.000)*
AIC	668.43	658.82	655.48	667.92	626.12	617.46	610.43	625.45	37.63	40.71	42.87	42.38

Note: ALL=All banks; CB=Conventional Banks; IB=Islamic Banks; S=Stratified Model; M=Macro Model; BS=Balance Sheet Data IS=Income Statement Data; FR=Financial Ratios. Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion Wald test for the joint significance of all explanatory variables.

Table 12

Macro Cox PH Results - Financial Ratios.

	ALL	**ALL**	**ALL**	**ALL**	**CB**	**CB**	**CB**	**CB**	**IB**	**IB**	**IB**	**IB**
	FR1-SM	**FR2-SM**	**FR4-SM**	**FR5-SM**	**FR1-M**	**FR2-M**	**FR4-M**	**FR5-M**	**FR1-M**	**FR2-M**	**FR4-M**	**FR5-M**
Z score	0.004	0.004	0.003	0.003	0.006	0.007	0.006	0.007	-0.008	0.000	-0.002	-0.003
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.005)*	*(0.919)*	*(0.147)*	*(0.136)*
ROA	-0.008	-0.023	-0.022	-0.024	–	–	–	–	-0.195	-0.492	-0.215	-0.307
(p-value)	*(0.641)*	*(0.064)*	*(0.125)*	*(0.068)*					*(0.295)*	*(0.108)*	*(0.189)*	*(0.108)*
CTI	0.004	0.004	0.003	0.003	0.004	0.004	0.004	0.004	0.013	-0.004	0.011	-0.002
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.002)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.641)*	*(0.843)*	*(0.578)*	*(0.931)*
Net Loans/Assets	0.022	0.018	0.005	0.016	0.033	0.034	0.027	0.034	-0.049	-0.031	-0.037	-0.042
(p-value)	*(0.006)*	*(0.022)*	*(0.517)*	*(0.028)*	*(0.000)*	*(0.000)*	*(0.002)*	*(0.000)*	*(0.000)*	*(0.019)*	*(0.072)*	*(0.091)*
Equity/Assets	–	–	–	–	-0.051	-0.044	-0.049	-0.046	0.110	0.104	0.072	0.070
(p-value)					*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.001)*	*(0.000)*	*(0.000)*	*(0.000)*
NIM	–	–	–	–	0.129	0.096	0.115	0.117	-0.338	-0.374	-0.201	-0.137
(p-value)					*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.284)*	*(0.194)*	*(0.173)*	*(0.114)*
Income Diversity	–	–	–	–	-0.001	-0.001	-0.001	-0.001	-0.024	-0.016	-0.017	-0.013
(p-value)					*(0.135)*	*(0.152)*	*(0.162)*	*(0.179)*	*(0.007)*	*(0.125)*	*(0.079)*	*(0.176)*
Liquid Assets/Deposits	–	–	–	–	0.005	0.005	0.005	0.005	-0.020	-0.016	-0.024	-0.023
(p-value)					*(0.003)*	*(0.021)*	*(0.007)*	*(0.012)*	*(0.066)*	*(0.059)*	*(0.299)*	*(0.387)*
Growth of GDP	-0.077	–	–	–	0.042	–	–	–	-0.493	–	–	–
(p-value)	*(0.001)*				*(0.082)*				*(0.002)*			
Inflation	–	0.007	–	–	–	0.008	–	–	–	0.111	–	–
(p-value)		*(0.069)*				*(0.044)*				*(0.000)*		
Concentration	–	–	-5.988	–	–	–	-4.958	–	–	–	6.759	–
(p-value)			*(0.002)*				*(0.034)*				*(0.118)*	
Strong	–	–	–	-0.558	–	–	–	-0.240	–	–	–	0.179
(p-value)				*(0.024)*				*(0.439)*				*(0.850)*
No. of subjects	415	415	415	415	314	314	314	314	99	99	99	99
No. of failures	87	87	87	87	82	82	82	82	5	5	5	5
No. of obs	4476	4476	4476	4476	3321	3321	3321	3321	755	755	755	755
Wald χ^2	59.56	52.04	58.39	54.11	96.57	104.43	90.33	92.33	47.37	30.03	38.91	47.87
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.004)*	*(0.000)*	*(0.000)*
AIC	834.36	839.16	829.99	836.96	578.68	578.69	574.95	579.82	33.87	34.99	39.67	40.76

Note: ALL=All banks; CB=Conventional Banks; IB=Islamic Banks; S=Stratified Model; M=Macro Model; BS=Balance Sheet Data IS=Income Statement Data; FR=Financial Ratios.Estimated coefficients and p-values in brackets. AIC=Akaike Information Criterion Wald test for the joint significance of all explanatory variables.

Table 13

Frailty Cox PH Results - Balance Sheet.

	ALL-BS	ALL-BS-S	ALL-BS-F1	ALL-BS-F2
Assets	0.638	0.649	0.618	0.783
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Growth of Assets	-9.407	-9.132	-9.498	-6.336
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.005)*
Growth of Equity	-0.102	-0.115	-0.102	-0.092
(p-value)	*(0.000)*	*(0.000)*	*(0.003)*	*(0.009)*
Liquid Assets	-0.001	-0.001	-0.001	-0.001
(p-value)	*(0.003)*	*(0.004)*	*(0.001)*	*(0.001)*
Other Earning Assets	-0.390	-0.386	-0.372	-0.483
(p-value)	*(0.003)*	*(0.002)*	*(0.002)*	*(0.001)*
Islamic	-1.207	–	–	-1.058
(p-value)	*(0.002)*			*(0.020)*
Theta (θ)	–	–	0.257	1.381
LR test $\theta = 0$			5.360	39.120
(p-value)			*(0.010)*	*(0.000)*
Frailty	–	–	Islamic	Country
No. of subjects	419	419	419	419
No. of failures	96	96	96	96
No. of obs	4155	4155	4155	4155
Wald χ^2	79.70	72.47	53.01	45.28
(p-value)	(*0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
AIC	711.82	665.61	716.21	672.70

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; BS=Balance Sheet

S=Stratified; F=Frailty Model. Estimated coefficients and p-values in brackets.

AIC=Akaike Information Criterion. Wald test for the joint significance of all explanatory variables.

LR=Likelihood Ratio. First two models are re-listed for comparison purposes.

Table 14

Frailty Cox PH Results - Income Statement.

	ALL-IS	ALL-IS-S	ALL-IS-F1	ALL-IS-F2
Growth of Overheads	-0.087	-0.085	-0.087	-0.064
(p-value)	*(0.036)*	*(0.041)*	*(0.166)*	*(0.360)*
Net Income	0.007	0.006	0.007	0.006
(p-value)	*(0.000)*	*(0.000)*	*(0.004)*	*(0.013)*
Net Interest Revenue	-0.002	-0.002	-0.002	-0.002
(p-value)	*(0.008)*	*(0.006)*	*(0.022)*	*(0.013)*
Other Operating Income	-0.002	-0.002	-0.002	-0.001
(p-value)	*(0.016)*	*(0.035)*	*(0.038)*	*(0.301)*
Islamic	-1.025	–	–	-0.611
(p-value)	*(0.009)*			*(0.169)*
Theta (θ)	–	–	0.172	2.088
LR test $\theta = 0$			2.890	51.720
(p-value)			*(0.044)*	*(0.000)*
Frailty	–	–	Islamic	Country
No. of subjects	418	418	418	418
No. of failures	91	91	91	91
No. of obs	4089	4089	4089	4089
Wald χ^2	36.53	24.27	18.68	16.04
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
AIC	712.19	666.71	715.86	660.46

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; IS=Income Statement

S=Stratified; F=Frailty Model. Estimated coefficients and p-values in brackets.

AIC=Akaike Information Criterion. Wald test for the joint significance of all explanatory variables.

LR=Likelihood Ratio. First two models are re-listed for comparison purposes.

Table 15

Frailty Cox PH Results - Financial Ratios.

	ALL-FR	ALL-FR-S	ALL-FR-F1	ALL-FR-F2
Z score	0.004	0.003	0.004	0.003
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.002)*
ROA	-0.025	-0.026	-0.026	-0.017
(p-value)	*(0.055)*	*(0.051)*	*(0.141)*	*(0.346)*
CTI	0.003	0.004	0.003	0.004
(p-value)	*(0.000)*	*(0.000)*	*(0.001)*	*(0.000)*
Net Loans/Assets	0.015	0.015	0.015	0.010
(p-value)	*(0.046)*	*(0.042)*	*(0.024)*	*(0.180)*
Islamic	-1.021	–	–	-0.457
(p-value)	*(0.033)*			*(0.389)*
Theta (θ)	–	–	0.144	1.101
LR test $\theta = 0$			1.32	21.16
(p-value)			*(0.125)*	*(0.000)*
Frailty	–	–	Islamic	Country
No. of subjects	415	415	415	415
No. of failures	87	87	87	87
No. of obs	4476	4476	4476	4476
Wald χ^2	51.91	50.40	38.25	28.71
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
AIC	878.08	839.79	881.36	859.64

Note: ALL=All banks; CB=Conventional banks; IB=Islamic banks; FR=Financial Ratios

S=Stratified; F=Frailty Model. Estimated coefficients and p-values in brackets.

AIC=Akaike Information Criterion. Wald test for the joint significance of all explanatory variables.

LR=Likelihood Ratio. First two models are re-listed for comparison purposes.

Table 16

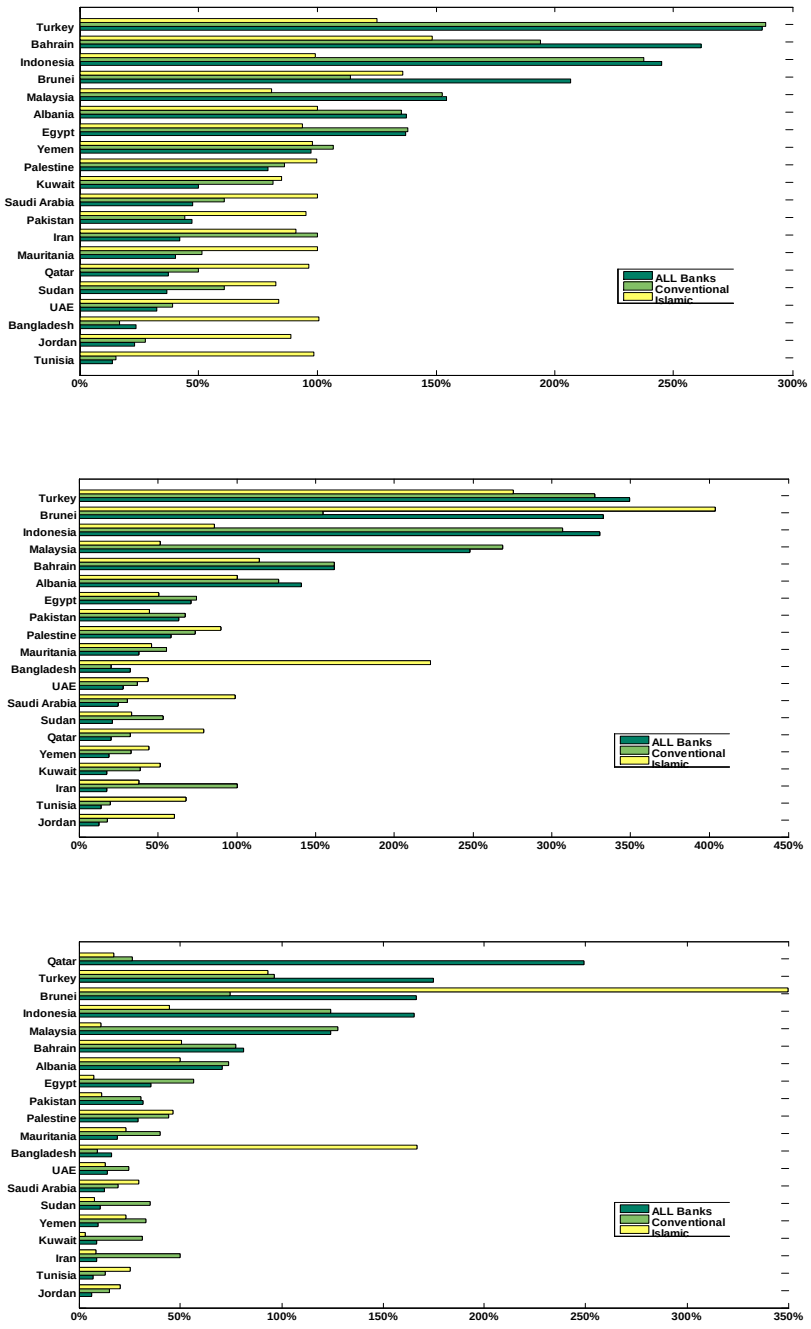
Log frailties (ν_i) for countries according to bank and data type.

Country	Balance Sheet			Income Statement			Financial Ratios		
	ALL	CB	IB	ALL	CB	IB	ALL	CB	IB
Albania	0.318	0.303	0.000	0.342	0.233	0.000	0.342	0.387	0.000
Bahrain	0.961	0.663	0.394	0.480	0.480	0.133	0.480	0.431	0.012
Bangladesh	-1.443	-1.788	0.007	-1.127	-1.600	0.801	-1.127	-1.700	1.205
Brunei	0.726	0.129	0.306	1.202	0.436	1.395	1.202	0.397	1.945
Egypt	0.316	0.323	-0.067	-0.345	-0.292	-0.682	-0.345	0.124	-1.939
Indonesia	0.896	0.865	-0.010	1.196	1.121	-0.155	1.196	0.908	-0.111
Iran	-0.862	0.000	-0.097	-1.746	0.000	-0.967	-1.746	0.000	-1.814
Jordan	-1.462	-1.284	-0.120	-2.087	-1.726	-0.505	-2.087	-1.215	-0.908
Kuwait	-0.695	-0.208	-0.166	-1.736	-0.944	-0.668	-1.736	-0.468	-2.869
Malaysia	0.434	0.423	-0.217	0.908	0.989	-0.664	0.908	0.936	-1.543
Mauritania	-0.906	-0.661	-0.002	-0.974	-0.584	-0.778	-0.974	-0.220	-0.767
Pakistan	-0.745	-0.815	-0.050	-0.459	-0.397	-0.805	-0.459	-0.495	-1.511
Palestine	-0.236	-0.150	-0.004	-0.538	-0.302	-0.112	-0.538	-0.120	-0.077
Qatar	-0.985	-0.695	-0.036	-1.606	-1.122	-0.240	-1.606	-0.637	-1.066
Saudi Arabia	-0.740	-0.502	-0.001	-1.390	-1.179	-0.014	-1.390	-0.962	-0.527
Sudan	-0.998	-0.502	-0.194	-1.566	-0.633	-1.098	-1.566	-0.355	-1.866
Tunisia	-1.988	-1.871	-0.016	-1.967	-1.612	-0.388	-1.967	-1.370	-0.691
Turkey	1.055	1.060	0.224	1.252	1.185	1.013	1.252	0.654	0.622
UAE	-1.128	-0.935	-0.180	-1.284	-0.992	-0.821	-1.284	-0.718	-1.347
Yemen	-0.028	0.064	-0.023	-1.674	-1.116	-0.812	-1.674	-0.419	-0.777

Note: BS=Balance Sheet; IS=Income Statement; FR=Financial Ratios; CB=Conventional Bank IB=Islamic Bank; ALL=All Banks. $\nu_i = \log(\alpha_i)$

Figure 2

Log frailties (ν_i) for countries according to bank and data type.



Note: Upper: Balance Sheet Data; Middle: Income Statement Data; Lower: Financial Ratios Data

Table 17
Macro Frailty Cox PH Results - Balance Sheet.

	ALL BS-FM1	ALL BS-FM2	ALL BS-FM4	ALL BS-FM5	CB BS-FM1	CB BS-FM2	CB BS-FM4	CB BS-FM5	IB BS-FM1	IB BS-FM2	IB BS-FM4	IB BS-FM5
Loans	–	–	–	–	–	–	–	–	-0.004	-0.003	-0.003	-0.003
(p-value)									*(0.038)*	*(0.072)*	*(0.058)*	*(0.065)*
Growth of Loans	–	–	–	–	-1.547	-1.247	-1.205	-1.249	–	–	–	–
(p-value)					*(0.000)*	*(0.001)*	*(0.001)*	*(0.001)*				
Growth of Equity	-0.098	-0.091	-0.097	-0.092	-0.122	-0.107	-0.111	-0.106	–	–	–	–
(p-value)	*(0.005)*	*(0.010)*	*(0.006)*	*(0.009)*	*(0.014)*	*(0.020)*	*(0.016)*	*(0.020)*				
Liquid Assets	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	–	–	–	–
(p-value)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*				
Other Earning Assets	-0.482	-0.486	-0.477	-0.479	-0.437	-0.439	-0.397	-0.442	-0.805	-0.749	-0.770	-0.714
(p-value)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.012)*	*(0.011)*	*(0.027)*	*(0.011)*	*(0.018)*	*(0.027)*	*(0.023)*	*(0.051)*
Assets	0.784	0.782	0.741	0.783	0.784	0.782	0.711	0.789	2.476	2.168	2.331	2.217
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.001)*	*(0.000)*	*(0.012)*	*(0.014)*	*(0.010)*	*(0.014)*
Growth of Assets	-7.476	-6.225	-5.952	-6.365	–	–	–	–	-16.718	-14.328	-14.011	-13.883
(p-value)	*(0.002)*	*(0.006)*	*(0.008)*	*(0.005)*					*(0.123)*	*(0.064)*	*(0.093)*	*(0.104)*
Islamic	-1.047	-1.049	-1.064	-1.034	–	–	–	–				
(p-value)	*(0.022)*	*(0.021)*	*(0.020)*	*(0.023)*								
Growth of GDP	0.044	–	–	–	0.068	–	–	–	-0.306	–	–	–
(p-value)	*(0.121)*				*(0.025)*				*(0.030)*			
Inflation	–	0.003	–	–	–	-0.001	–	–	–	0.054	–	–
(p-value)		*(0.614)*				*(0.904)*				*(0.059)*		
Concentration	–	–	-4.298	–	–	–	-4.902	–	–	–	1.816	–
(p-value)			*(0.085)*				*(0.087)*				*(0.689)*	
Strong	–	–	–	-0.336	–	–	–	-0.428	–	–	–	-0.260
(p-value)				*(0.609)*				*(0.517)*				*(0.794)*
Theta (θ)	1.465	1.341	1.380	1.350	1.248	1.162	1.105	1.102	0.249	0.297	0.089	0.434
LR test $\theta = 0$	41.170	33.380	37.030	37.650	40.010	32.360	33.240	34.690	0.060	0.080	0.010	0.110
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.401)*	*(0.388)*	*(0.471)*	*(0.370)*
Frailty	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country
No. of subjects	419	419	419	419	315	315	315	315	100	100	100	100
No. of failures	96	96	96	96	89	89	89	89	7	7	7	7
No. of obs	4155	4155	4155	4155	3332	3332	3332	3332	800	800	800	800
Wald χ^2	47.22	45.74	47.97	45.81	42.55	38.73	40.91	32.19	9.32	9.62	7.16	6.72
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.096)*	*(0.086)*	*(0.209)*	*(0.242)*
AIC	672.09	674.46	671.25	674.45	582.40	588.13	584.65	587.74	35.59	37.81	40.65	40.70

Note: ALL=All banks; CB=Conventional Banks; IB=Islamic Banks; S=Stratified Model; M=Macro Model; BS=Balance Sheet Data.
AIC=Akaike Information Criterion; LR=Likelihood Ratio. $\nu_i = \log(\alpha_i)$
Estimated coefficients and p-values in brackets. Wald test for the joint significance of all explanatory variables.

Table 18

Macro Frailty Cox PH Results: - Income Statement.

	ALL	**ALL**	**ALL**	**ALL**	**CB**	**CB**	**CB**	**CB**	**IB**	**IB**	**IB**	**IB**
	IS-FM1	**IS-FM2**	**IS-FM4**	**IS-FM5**	**IS-FM1**	**IS-FM2**	**IS-FM4**	**IS-FM5**	**IS-FM1**	**IS-FM2**	**IS-FM4**	**IS-FM5**
Growth of Overheads	-0.068	-0.067	-0.069	-0.065	-0.050	-0.047	-0.047	-0.045	-0.988	-0.934	-1.023	-1.109
(p-value)	*(0.318)*	*(0.324)*	*(0.331)*	*(0.346)*	*(0.547)*	*(0.569)*	*(0.607)*	*(0.597)*	*(0.101)*	*(0.146)*	*(0.154)*	*(0.123)*
Net Income	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	-0.135	-0.142	-0.141	-0.141
(p-value)	*(0.014)*	*(0.013)*	*(0.011)*	*(0.013)*	*(0.013)*	*(0.012)*	*(0.010)*	*(0.012)*	*(0.153)*	*(0.172)*	*(0.206)*	*(0.177)*
Net Interest Revenue	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.018	-0.018	-0.016	-0.018
(p-value)	*(0.015)*	*(0.021)*	*(0.008)*	*(0.014)*	*(0.019)*	*(0.025)*	*(0.010)*	*(0.019)*	*(0.364)*	*(0.393)*	*(0.417)*	*(0.357)*
Other Operating Income	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.005	-0.006	-0.009	-0.005
(p-value)	*(0.282)*	*(0.351)*	*(0.236)*	*(0.292)*	*(0.408)*	*(0.479)*	*(0.429)*	*(0.437)*	*(0.745)*	*(0.737)*	*(0.739)*	*(0.771)*
Growth of GDP	0.022	–	–	–	0.032	–	–	–	0.018	–	–	–
(p-value)	*(0.418)*				*(0.266)*				*(0.124)*			
Inflation	–	0.006	–	–	–	0.004	–	–	–	0.043	–	–
(p-value)		*(0.270)*				*(0.407)*				*(0.108)*		
Concentration	–	–	-4.903	–	–	–	-6.454	–	–	–	-1.712	–
(p-value)			*(0.061)*				*(0.031)*				*(0.742)*	
Strong	–	–	–	-0.527	–	–	–	-0.349	–	–	–	-1.560
(p-value)				*(0.493)*				*(0.618)*				*(0.284)*
Theta (θ)	2.338	2.151	1.986	2.196	1.672	1.514	1.318	1.575	1.254	1.321	2.674	3.117
LR test $\theta = 0$	58.190	47.540	44.960	57.020	46.570	37.230	35.180	44.810	0.558	0.220	0.510	1.200
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.245)*	*(0.321)*	*(0.238)*	*(0.137)*
Frailty	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country
No. of subjects	418	418	418	418	315	315	315	315	104	104	104	104
No. of failures	91	91	91	91	84	84	84	84	7	7	7	7
No. of obs	4089	4089	4089	4089	3308	3308	3308	3308	793	793	793	793
Wald χ^2	14.44	15.61	17.63	14.69	19.35	18.29	18.29	13.92	7.25	7.76	5.41	6.22
(p-value)	*(0.013)*	*(0.008)*	*(0.003)*	*(0.012)*	*(0.001)*	*(0.002)*	*(0.002)*	*(0.016)*	*(0.195)*	*(0.170)*	*(0.368)*	*(0.285)*
AIC	661.86	661.40	658.40	662.10	578.89	580.24	575.25	580.64	41.54	41.39	43.49	42.45

Note: ALL=All banks; CB=Conventional Banks; IB=Islamic Banks; S=Stratified Model; M=Macro Model; IS=Income Statement Data.

AIC=Akaike Information Criterion; LR=Likelihood Ratio. $\nu_i = \log(\alpha_i)$

Estimated coefficients and p-values in brackets. Wald test for the joint significance of all explanatory variables.

Table 19
Macro Frailty Cox PH Results - Financial Ratios.

	ALL	ALL	ALL	ALL	CB	CB	CB	CB	IB	IB	IB	IB
	FR-FM1	**FR-FM2**	**FR-FM4**	**FR-FM5**	**FR-FM1**	**FR-FM2**	**FR-FM4**	**FR-FM5**	**FR-FM1**	**FR-FM2**	**FR-FM4**	**FR-FM5**
Z score	0.003	0.003	0.003	0.003	0.005	0.006	0.006	0.006	-0.005	0.002	-0.001	-0.002
(p-value)	*(0.001)*	*(0.002)*	*(0.004)*	*(0.002)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.657)*	*(0.798)*	*(0.920)*	*(0.887)*
ROA	0.002	-0.017	-0.014	-0.017	0.104	0.083	0.093	0.091	0.292	0.167	0.153	0.184
(p-value)	*(0.928)*	*(0.344)*	*(0.470)*	*(0.349)*	*(0.001)*	*(0.010)*	*(0.001)*	*(0.002)*	*(0.113)*	*(0.212)*	*(0.267)*	*(0.209)*
CTI	0.005	0.004	0.004	0.004	0.005	0.004	0.004	0.004	–	–	–	–
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*				
Net Loans/Assets	0.016	0.009	0.006	0.009	0.030	0.031	0.029	0.031	-0.019	-0.001	-0.024	-0.028
(p-value)	*(0.028)*	*(0.219)*	*(0.391)*	*(0.187)*	*(0.001)*	*(0.000)*	*(0.001)*	*(0.000)*	*(0.441)*	*(0.970)*	*(0.271)*	*(0.219)*
Equity/Assets	–	–	–	–	-0.044	-0.038	-0.043	-0.040	0.032	0.017	0.021	0.034
(p-value)					*(0.001)*	*(0.004)*	*(0.001)*	*(0.002)*	*(0.183)*	*(0.451)*	*(0.376)*	*(0.218)*
NIM	–	–	–	–	0.104	0.083	0.093	0.091	-0.347	-0.229	-0.199	-0.211
(p-value)					*(0.001)*	*(0.010)*	*(0.001)*	*(0.002)*	*(0.126)*	*(0.192)*	*(0.223)*	*(0.204)*
Income Diversity	–	–	–	–	-0.001	0.004	-0.001	-0.001	-0.078	-0.049	-0.054	-0.058
(p-value)					*(0.063)*	*(0.100)*	*(0.074)*	*(0.079)*	*(0.182)*	*(0.192)*	*(0.181)*	*(0.162)*
Liquid Assets/Deposits	–	–	–	–	0.004	0.003	0.003	0.003	–	–	–	–
(p-value)					*(0.085)*	*(0.192)*	*(0.150)*	*(0.185)*				
Growth of GDP	-0.078	–	–	–	0.075	–	–	–	-0.491	–	–	–
(p-value)	*(0.002)*				*(0.038)*				*(0.041)*			
Inflation		-0.001	–	–	–	0.004	–	–	–	0.063	–	–
(p-value)		*(0.871)*				*(0.507)*				*(0.104)*		
Concentration	–	–	-5.901	–	–	–	-3.751	–	–	–	1.623	–
(p-value)			*(0.011)*				*(0.211)*				*(0.767)*	
Strong	–	–	–	-0.736	–	–	–	-0.244	–	–	–	-2.647
(p-value)				*(0.278)*				*(0.708)*				*(0.169)*
Theta (θ)	1.474	1.460	1.295	1.386	1.205	1.079	1.008	1.104	4.438	2.519	5.253	5.169
LR test $\theta = 0$	25.560	21.470	14.970	20.650	27.510	23.820	21.560	25.330	3.150	0.900	2.150	2.640
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.038)*	*(0.171)*	*(0.071)*	*(0.052)*
Frailty	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country
No. of subjects	415	415	415	415	314	314	314	314	99	99	99	99
No. of failures	87	87	87	87	82	82	82	82	5	5	5	5
No. of obs	4476	4476	4476	4476	3321	3321	3321	3321	755	755	755	755
Wald χ^2	37.29	28.03	34.19	29.05	62.08	58.45	58.99	58.06	6.40	6.31	4.61	5.42
(p-value)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.602)*	*(0.613)*	*(0.799)*	*(0.712)*
AIC	852.07	860.40	852.97	859.29	508.01	512.59	511.19	512.87	45.58	49.25	51.86	49.90

Note: ALL=All banks; CB=Conventional Banks; IB=Islamic Banks; S=Stratified Model; M=Macro Model; FR=Financial Ratios.
AIC=Akaike Information Criterion; LR=Likelihood Ratio. $\nu_i = \log(\alpha_i)$
Estimated coefficients and p-values in brackets. Wald test for the joint significance of all explanatory variables.