

Partnership Financing and Early Warning System during Financial Crisis

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ABSTRACT

This paper attempt to estimate the effect of partnership financing (PF) on Islamic banks during financial crises using early warning system (EWS). PF has significant impact to reduce the probability of crises in Islamic banks. The results further show that Islamic bank with high economic freedom have higher chances of experiencing crises relative to the Islamic subsidiaries banks. In addition, bank with higher M2/ reserve and GDP growth are significantly has a beneficial impact of reducing crisis probability. Meanwhile for higher market concentration and inflation are more likely to expose bank to have crises.

Key Words: *Financial Crisis, Early Warning System, logit model, Islamic Bank*

ABSTRAK

Kajian ini bertujuan menganggarkan kesan pembiayaan perkongsian ke atas bank Islam semasa krisis kewangan dengan menggunakan kaedah Sistem Amaran Awal (EWS). Pembiayaan perkongsian menunjukkan kesan yang signifikan dalam mengurangkan kebarangkalian berlakunya krisis kepada bank Islam. Seterusnya, bank Islam yang mempunyai kebebasan ekonomi yang tinggi terdedah kepada krisis berbanding anak syarikat bank Islam. Rizab dan kadar pertumbuhan KDNK yang tinggi mempunyai kesan yang signifikan untuk mengurangkan kebarangkalian krisis. Manakala konsentrasi pasaran dan kadar inflasi yang tinggi lebih cenderung untuk mendedahkan bank mengalami krisis.

Kata Kunci: *Krisis Kewangan, Sistem Amaran Awal, Model Logit, Bank Islam*

INTRODUCTION

The recent global financial crisis which occurred in 2007-2009 has resulted in the threat of total collapse of large financial institutions, the bailout of banks by national governments, downturns in stock markets and declining in housing markets around the world. One of the major cause of this crisis is due to debt (Chapra, 2008). In year 2003-2004, interest rates for housing loans in the United States decreased from 8 % to 5 % (Chapra, 2008). This resulted in an increase in the demand for houses, but due to limited supply, house prices increased. In 2007, the supply of mortgage credit contributed to a rise in homeownership to 68 % (Chapra, 2008). As a result, banks started offering sub-prime loans at a teaser rate. However in 2005-2006, the teaser interest rate period ended leaving many customers unable to meet their loan repayments. Consequently, people and banks start borrowing from each other. As a result, in 2008-2009 there was a global systemic collapse in the global financial system. During this period, there was a global reduction in the demand for goods and services resulting in the shrinking of the global economy and many people suffered with debt.

The effects of this global financial crisis were similar to the effects felt from the 1997 Asian Financial crisis. During the Asian financial crisis, the global banking systems are highly exposed to the property and equity sectors. It approximately 42.6 % exposed to these sector as compared to only 21 % exposed to the manufacturing sector. The exposure to the property sector in East Asian countries such as Malaysia, Indonesia, Thailand and Singapore was roughly 25 to 40% of total bank loans (Sufian, 2010). The drop in property and equity prices caused large losses and many property companies defaulted on their financial obligations along with those engaged in the equity market. Furthermore, domestic banks were hit by the withdrawal of foreign funds, foreign exchange losses, sharp increase in non-performing loans and losses on equity holdings (Sufian, 2010).

The global financial crises have stimulated new interest among policymakers as highlighted by IMF (Dominique, 2008) and scholars (Barrell et al., 2010) in early warning systems (EWSs). The EWS is important and relevant to estimate the occurrence of a banking crisis, currency and debt crisis (Davis and Karim, 2008a). Furthermore, it helps the authorities to warn the financial market participants through speeches or Financial Stability Reviews on the potential risks (Davis and Karim, 2008a). This may help the authorities to prepare an adequate rescue policies to avoid or at least lessen the adverse effect of financial crisis. Unfortunately, economists do not have a particularly good track record in predicting the timing of crises. Most of the previous studies focus on modeling the incidence of crises across countries such as (Coudert and Idier, 2018; Nguyen and Ngoc Duy, 2017; Papanikolaou, 2017; Tamaddonjad, Abd- Majid and Abd-Rahman, 2016; Babecký et al., 2014; Barrell et al., 2010; Caggiano et al., 2014; Davis and Karim, 2008a; Demirgüç-Kunt and Detragiache, 1998; Mannasoo and Mayes, 2009; Rose and Spiegel, 2012) while (Escudero and Dabos, 2004), focus on across conventional banks in Argentina, (Almanidis and Sickles, 2012; Calomiris and Mason, 2000; Henebry, 1997) in United Kingdom and United States (Papanikolaou, 2017) while only Othman, Abd-Majid and Abd-Rahman, (2018) focus on Islamic banks in Malaysia and Indonesia. Past studies (Hassan & Dridi, 2011) showed that Islamic banks performed better than conventional banks during the crisis. Theoretically, Islamic banks are less affected by the crisis due to its unique principle which based on profit-loss sharing (PF). By applying PF, Islamic banking should ensure that its financial transactions are

anchored in the real economy. The linkage ensured that funds are allocated and utilized for real economic activities and mitigate lending for speculative activities. Speculative activities which involve uncertainties and gambling are strictly prohibited in Islamic banking because it encourages dispute and conflict between contracting parties. Hence, it is important to look into the probability of crises in Islamic banks with precise focus on PF. PF refers to partnership arrangement between banks and client as the entrepreneur where the profit and loss are shared based on the capital contribution or agreed ratios.

Therefore, this study aim to estimate the effect of PF on Islamic banking during financial crises using the logit model in EWS. Our findings shows that PF had significant impact in reducing crisis probability experienced by the Islamic banking system. The result further indicated that economic freedom, M2/ reserve and GDP growth are less likely to expose banks towards crises. Meanwhile for higher market concentration and inflation are more likely to expose bank to have crises.

This study contributes to the literature in several ways. First, the current study innovates by including logit model in EWS to estimate crises rather than dummy variables to represent financial crises for Islamic banks (Ahmad et al., 2010; Beck et al., 2013; Kassim and Majid, 2010; Said, 2012; Sufian, 2010). Second, it extend the study done by Othman, Abdul-Majid & Abdul- Rahman (2018) by upgrading the Islamic bank data from 1996 to 2015.

The current study is organized as follows. Section 2 defines financial crisis, explaining the different approaches in developing EWS, providing the threshold and extensive review on early warning indicators. While in Sec. 3 it discusses the data and methodology. Section 4 provides data analysis and lastly, Sec. 5 is the conclusion and some suggestions for future research.

LITERATURE REVIEW

According to economists, ‘crisis’ refers to a specific situation in which the real economy is seriously and adversely affected. It caused a huge drop in employment opportunities, production and purchasing power. Besides, many households and firms or governments are unable to meet their obligations (Allen & Snyder, 2009). Meanwhile, the term ‘financial crisis’ is generally defined to be ‘a wider range of disturbances, for example sharp declines in asset prices, increases in non-performing loan, failures of large financial intermediaries, or disruption in foreign exchange markets’ and a dysfunction at the level of market mechanism (De Bonis et al., 1999 and (Percic & Apostoaie, 2013). As a result of a large number of financial crises such as banking and currency crises; Asia (1997), the Russian Federation (1998) and Turkey (2000), currency and fiscal crises; Brazil (1999) and currency and external debt crises; Argentina (2001) and Mexico (1994), International Organizations such as Private Sector Institutions started to develop Early Warning System (EWS) models to predict whether and when individual countries were hit with financial crisis. The model enables the prediction of the occurrence of a crisis within a specific time and is applicable to currency, banking and fiscal crises.

In the face of the recent global financial crisis, monitoring and predicting such an event using the EWS have become essential, as the financial crisis causes huge losses at both the national

and international levels. Previous research pointed out that high non-performing financing (Barrell et al., 2010; Singh 2009), large-scale bailout costs (Demirgüç-Kunt and Detragiache, 1998; Demirgüç-Kunt and Detragiache, 2005; Singh 2009), mergers and acquisition (Singh 2009), high liquidity funding from the central bank (Mannasoo and Mayes, 2009; Khadraoui, 2012), bankruptcy and closures show the signal or threshold for banking crisis (Demirgüç-Kunt and Detragiache, 1998; Demirgüç-Kunt and Detragiache, 2005; Singh 2009).

A threshold is a set of indicators to measure the potential effect of a crisis towards a certain country or organization. It is important to help direct the actions of the crisis management team in a particular country or organization. Different study may have different threshold such as an increase in reserve money, increase in non-performing financing, decrease in the values of bank assets and increase in merging of financial institutions (Singh, 2009). In addition, some past studies outlined that a financial crisis is determined when nonperforming loans to total banking system assets exceeded 10% (Barrell et al., 2010; Singh, 2009) public bailout costs more than 3% of GDP (Demirgüç-Kunt and Detragiache, 1998, 2005; Singh 2009), extensive deposit runs, and emergency measures by government such as bank holidays, deposit guarantees and freezes as well as bank closure (Demirgüç-Kunt and Detragiache, 1998, 2005; Singh 2009). In another study, Gonzalez-Hermosillo (1996), set a threshold that bank failure occurs when a bank receives financial assistance from the Venezuelan government more than 13% of GDP.

Focusing on the determinants of banking crisis, previous studies include both micro- and macro level data as the determinants of crises. For micro level data, Bongini, Claessens, & Ferri, (2000) and Bongini, Laeven, & Majnoni (2001) included return on assets, loan loss reserves to capital, loan growth, net interest income, and loans to borrowings were important indicators for predicting banking crises in financial institutions in Indonesia, Korea, Malaysia, the Philippines, and Thailand. In addition, capital adequacy, liquidity and property prices are important in predicting financial crisis (Barrell, Davis, Karim, & Liadze, 2010). However, certain microeconomic variable such as non-performing loans and capital-asset ratios often deteriorate rapidly before banking crises (Gonzalez-Hermosillo, 1996) and reducing non-performing loans may delay a banking crisis (Davis & Karim, 2008b).

Now we turn to macroeconomic variables in predicting banking crisis. Countries with low GDP growth, high inflation and interest rates, high money supply to foreign exchange reserves, high credit to private sector as the ratio of GDP, high credit growth, and low GDP per capita are more expose to higher probability of banking crisis by using logit approach. Furthermore, countries with deposit insurance coverage and weak institutions are more prone to suffer a systemic banking crisis (Demirguc Kunt & Detragiache, 2005 and Davis and Karim, 2008). By applying a multivariate logit model, Mannasoo and Mayes (2009) reported that inflation, exchange rate change, Herfindahl index and stock market index are significant in early warnings of distress. In addition, international reserves and real exchange rate overvaluation are the top two indicators of recent financial crisis (Frankel & Saravelos, 2012).

In summary, the current research extend the previous research done by Othman et al. (2018) by including PF measured by ratio of total equity financing to total debt financing to estimate its effect on Islamic banking operation during the crises. We further focus on the individual bank level data to estimate the effect of crises. Besides, we use EWS to estimate crisis

because it consists an accurate definition of a crisis and significantly better than random guesses in predicting the Asia crises (Berg, Borensztein, & Pattillo, 2004). In addition, it allows us to include different choice of dependent variables in determining predictive capacity. The transforming indicators including standardization, lags and interaction terms improve the performance of EWS and hence improves crisis predictive ability (Davis & Karim, 2008a).

DATA & METHODOLOGY

This paper includes unbalanced panel data sets of 17 Islamic banks in Malaysia and 9 Islamic banks in Indonesia for the period of 1996 to 2015. The data obtained from Bank Annual Report, Bank scope, International Financial Statistics, Euro money Journal and World Bank Development (WDI) Data. In predicting a crisis, Frankel & Rose, (1996); and Demirgüç-Kunt & Detragiache, (1998) used logit/probit approach while Kaminsky & Reinhart, (1999) used signal approach and Duttagupta & Cashin, (2008) focus on binary classification trees (BCT). The logit /probit model consist of macroeconomics, financial, monetary and institutional variables that are predicted to determine the likelihood of a systemic banking crisis. The multivariate logistic function is one of the most popular specifications used to predict the probability of crises (Demirgüç-Kunt & Detragiache, 1998; Eichengreen, Rose, & Wyplosz, 1996; Frankel & Rose, 1996).

Based on different approaches discussed above, the logit approach is preferably suited in predicting binary outcome of financial crisis or no financial crisis. Its use of multiple explanatory variables as compared to the signal approach which assesses the behaviour of single variables prior to and during crisis episodes (Davis and Karim, 2008a; Nguyen 2017). Eventhough the BCT able to compare all potential variables at all possible threshold values, the discovery of relationships becomes localized. It cannot be used to establish any general relationships that hold through the sample. It is unable to provide the marginal contribution to the overall probability of a particular outcome unlike logit/probit regression techniques (Duttagupta and Cashin, 2008).

The explanatory variables are divided into three sections; bank specific, macroeconomics and supervision variables. Table 1 provide descriptive statistics for each variable which is included in the model. For bank specific variables it includes non-performing financing (NPPFINANCING) as a measure of credit performance. It is expected to have a positive relationship where the higher the non-performing financing, the poorer is the assets/credit performance of banks (Mannasoo and Mayes, 2009) thus it exposes a bank to have financial crisis. The new variable introduced in this study is the ratio of total equity financing (PF) to total debt financing. Banks are less likely to experience crises with higher PF. An increase in economic activity such as investment leads to an increase in demand for PF. Thus, PF can be used as a measure of economic activity. Furthermore, the implementation of PF helps Islamic banks to remain resilient during the global financial crises (Hassan & Dridi, 2010; Chazi & Syed, 2010). Under the implementation of PF, Islamic banks share financing, management and profit with their clients. Losses, if any, are shared based on the initial contribution in the business. Moreover, PF helps in the development of both the spiritual and socio-economic well- Islamic banks are said to be less affected from the global financial crisis (Chazi & Syed, 2010). It is due to intrinsic principles such as its asset-based and risk sharing nature (Hasan & Dridi, 2011). These unique principles of Islamic banking were able to avoid the direct effect of financial crisis (Hassan & Dridi, 2010).

For macroeconomic variables we include ratio of M2 to total reserve (M2RES). M2 to total reserve is the ratio is used to measure capital outflow in a country (Kaminsky & Reinhart, 1999; Demircug-kunt & Detragiache, 1998 and Demircug-kunt & Detragiache, 2005). High world interest rate may anticipate currency crises as they lead to capital outflows. Capital account problem become more severe when the country's foreign debt is large and thus it may raise the issue of debt unsustainability. Debt concentrated at short maturities will increase the exposure of a country to crisis.

Then, we further include inflation, official exchange rate and GDP growth to capture the macroeconomic impact on crisis. The higher the inflation, official exchange rate and low GDP growth lead to higher probability for financial crisis to occur (Barrell, Davis, Karim and Liadze, 2010; Kassim and Abd Majid, 2010; Mannasoo and Mayes, 2009; Duttagupta and Cashin, 2008; Kaminsky & Reinhart, 1999 and Demircug-kunt & Detragiache, 1998). Inflation (INFL) included in the model to capture the impact of asset price boom. High inflation signals policy mismanagement which causes higher nominal interest rates at the expense of lenders. High interest rate may cause lenders to bear higher debt and thus expose them to crisis. Official exchange rate (EXRATE) add to the vulnerability of the banking sector since the loss of competitiveness and external market could lead to a recession business failure and decline in loan quality. Thus, large negative shock to exports, the terms of trade and real exchange rate are interpreted as symptoms of financial crisis (Kaminsky & Reinhart, 1999). GDP growth (YG) is used as a proxy for economic development. Recession or widespread drop in spending may expose a country to a crisis.

Meanwhile for supervision variables, the current study includes Herfindahl concentration index (HHI) as a measure for market concentration. Based on Barrell et al. (2010) and Mannasoo and Mayes (2009), high market concentration causes less probability for bank having financial crisis. Bank concentration may imply more market power for banks. In markets with asymmetric information, bank with high market concentration may increase their incentives to invest in the acquisition of soft information by establishing close relationships with borrowers over time. This will facilitate the availability of credit and thereby reducing firms' financial constraints thus might reduce the probability of bank to have crisis. The better the information banks have about the quality of firms' investment opportunities, the more the lower credit supply might be turned to more profitable investments. In such cases, bank concentration might reduce the probability of crises. On the other hand, in a perfect market, bank concentration may imply more market power for banks, involving higher interest rates and lower availability of funds and thus expose bank to higher probability of crisis.

In addition, according to Barrell et al. (2010) and Beck, Demircug-Kunt, & Levine, (2006), high economic freedom (ECOFREE) leads to greater bank fragility, therefore, increase vulnerability for bank having financial crisis. Bank with financial freedom, capture transparent and the absence of government interventions cause bank more likely to expose to crisis (Bjornskov, (2016).

Besides, we also include dummy variable such as full-fledged Islamic bank (full-fledged Islamic bank =1, subsidiaries 0) because most of the previous research such as Ahmed (2010), Hasan & Dridi, (2011), Mannasoo & Mayes, (2009) and Paul & Jyothi (2010) stated that Islamic banks are more stable compared to conventional banks during the financial crisis. Finally, to capture the impact of bank ownership to the probability of crisis, this study also includes public ownership bank dummy which denotes as 1= public ownership bank and 0 = private ownership bank.

TABLE 1: List of variables for Logit Model

Categories	Variables	Definition
Bank specific variable	NPFINANCING	Non-performing financing/total financing
	PF	Total equity financing/total debt financing
Macroeconomic variable	INFL	inflation rate
	YG	real GDP growth
	EXRATE	official exchange rate
	M2RES	M2/total reserve
Supervision variable	HHI	Herfindahl concentration index
	ECOFREE	Economic freedom
Bank dummies	ISLFFDOM	Islamic full-fledge bank-domestic
	PUBLICD	Public ownership bank

The logit coefficients are more accurate in interpreting the variables and they do not reflect the threshold effects that may be simultaneously exerted by other variables (Davis & Karim, 2008b).

The cumulative logistic function that will be employed is as follows:

$$P_{it} = \text{PROB}(Y_{it}) = 1 = F(\beta X_{it}) = \frac{e^{\beta' X_{it}}}{1 + e^{\beta' X_{it}}} \quad \dots \quad (1)$$

where:

- Y = banking crisis dummy for county i at time t
- X_{it} = vector of explanatory variable
- $F(\beta X_{it})$ = cumulative distribution function in the logistic functions

Based on equation 1, P_{it} is nonlinear in X and in the parameters, $CRISIS'$. Therefore, we cannot use Ordinary Least Square (OLS) to estimate the parameters of equation 3.1. Equation 3.1 can be linearized as follows:

$$P_i = \frac{1}{1 + e^{-z_i}} = \frac{e^z}{1 + e^z} \quad \dots \quad (2)$$

Where, $Z^i = \beta_1 + \beta_2 X^i$

If probability P_i the probability of having a crisis, then, $(1 - P_i)$ the probability of not having a crisis is

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \quad \dots \quad (3)$$

Therefore, we can write

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad \dots \quad (4)$$

Now if we take the natural log for equation (4), we obtain:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \beta_1 + \beta_2 X_{it} \quad \dots \quad (5)$$

Based on equation (5), although we can easily interpret the signs on the coefficients as representing an increasing or decreasing effect on crisis probability, the values are not as intuitive to interpret. Therefore, we need the log likelihood function, which we use to obtain the actual parameter estimates:

$$Log_e L = \sum_{i=1}^n \sum_{t=1}^n [(Y_{it} \log_e F(\beta' X_{it})) + (1 - Y_{it}) \log_e (1 - F(\beta' X_{it}))] \quad \dots \quad (6)$$

Where $Log_e L = \ln\left(\frac{P_i}{1 - P_i}\right)$

$$Y_{it} \log_e F(\beta' X_{it}) = \beta_1$$

$$(1 - Y_{it}) \log_e (1 - F(\beta' X_{it})) = \beta_2 X_{it}$$

Equation (6) shows the coefficient on X_{it} are not constant marginal effects of the variable on banking crisis probability since the variable's effect is conditional on the values of all other explanatory variables at time t . (Barrell et al., 2010a).

After the crisis indicators are determine, a diagnostic test is run to ensure the validity of the model in in-sample and out-of-sample prediction. The out-of-sample prediction randomly will exclude a few banks from the observation to check the robustness of the model.

EMPIRICAL RESULTS

In order to obtain final model specification, following (Barrell, Davis, Karim, & Liadze, 2010b; Caggiano et al., 2014) this study use a general to specific approach, starting with all variables listed in Table 2. Referring to Table 2, under the general to specific approach, the least significant variable in the previous stages was omitted. In addition, for the robustness of the model and to avoid the endogenous effect of crises on the explanatory variables, all variables have been lag by one period, however the model do not converge. The final model (Model 2) specification as follows:

$$\log \left[\frac{p(crisis)}{1-p(crisis)} \right] = -0.17PF -0.17M2RES -0.08YG -0.02ECOFREE + 0.006HHI + 0.04INFLATION \quad \dots 7$$

The result in Table 2 clearly shows that PF, economic freedom, M2/ reserve, GDP growth, are significantly has a beneficial impact of reducing crisis probability. Meanwhile for higher market concentration and inflation are more likely to expose bank to have crises. All variables are consistent in significant level and sign throughout all stages in the general to specific approach. The other variables such as non-performing financing, full-fledged Islamic banks and official exchange rate are not significant in determining financial crisis in Malaysia and Indonesian Islamic banks.

Referring to Table 2, under the general to specific approach, the stages start from Model 1 to Model 4. Throughout the stages, the least significant variable in the previous stages was omitted. The final Model we refer to Model 4. In addition, for the robustness of our model and to avoid the endogenous effect of crises on the explanatory variables, we lag all the variables by one period, however the model do not converge. This implies that the developments in the economy from previous years are not important in affecting the occurrence of crises.

TABLE 2: General to specific approach

Variables	Model 4		Model 3		Model 2		Model 1	
	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
PF	-1.73	0.05	-1.67	0.05	-1.63	0.05	-1.41	0.10
ECOFREE	-0.17	0.06	-0.18	0.05	-0.16	0.09	-0.25	0.07
M2RES	-1.79	0.00	-1.80	0.00	-1.91	0.00	-1.73	0.01
YG	-0.77	0.00	-0.80	0.00	-0.81	0.00	-0.77	0.00
HHI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INFL	0.44	0.00	0.45	0.00	0.47	0.00	0.46	0.00
NPFINANCING			-1.37	0.30	-1.49	0.27	-1.79	0.20
ISLFFDOM					-0.34	0.49	-0.56	0.30
EXRATE							0.00	0.35

Note:PF- partnership financing, ECOFREE- Economic freedom, M2RES- M2/reserve, YG- GDP growth, HHI- Herfindahl concentration index, INFL-inflation, NPFINANCING- Non-performing financing, ISLFFDOM- Islamic full-fledged bank- domestic, EXRATE-exchange rate.

Since the values on the coefficient are not as intuitive to interpret the increasing or decreasing effect on crisis probability, it is worth investigating their individual marginal effect on crises.

Based on Model 2 in Table 3, PF less likely expose bank to crises. The implication is that a one point rise in PF could reduce crisis probability by at least 17%. Next, bank with higher reserve ratio are also less likely exposed to crisis as much as 17%. Then, it follows by GDP growth (8%), inflation (4%), economic freedom (2 %) and herfindahl index by (0.006 %). Based on cut – off threshold level at 0.5, Model 2 correctly classified crisis about 88.4%.

TABLE 3: Marginal effect of a 1 point rise in the variable on crisis probability

Variables	Model 1				Model 2			
	Coef.	P>z	Marginal effect	P>z	Coef.	P>z	Marginal effect	P>z
PF	-1.41	0.10	-0.01	0.14	-1.73	0.05	-0.17	0.03
ECOFREE	-0.25	0.07	0.00	0.06	-0.17	0.06	-0.02	0.02
M2RES	-1.73	0.01	-0.01	0.03	-1.79	0.00	-0.17	0.02
YG	-0.77	0.00	0.00	0.00	-0.77	0.00	-0.08	0.01
HHI	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
INFL	0.46	0.00	0.00	0.01	0.44	0.00	0.04	0.01
NPFINANCING	-1.79	0.20	-0.01	0.07				
ISLFFDOM	-0.56	0.30	0.00	0.29				
EXRATE	0.00	0.35	0.00	0.34				
constant	24.99	0.00			19.26	0.00		
Log likelihood	-67.130				-68.450			
Pseudo R ²	0.500				0.490			
Correctly classified crisis (%)	0.891				0.884			
Observation	241.00				241.00			

Note:PF- partnership financing, ECOFREE- Economic freedom, M2RES- M2/reserve, YG- GDP growth, HHI Herfindahl concentration index, INFL-inflation, NPFINANCING- Non-performing financing, ISLFFDOM- Islamic full-fledged bank- domestic, EXRATE-exchange rate.

To confirm the validity of Model 2 in Table 3, it is important to re-estimate the logit equation by randomly drop a few observation from the sample. For out- of- sample prediction, the model was estimated using 144 observations which include 15 Malaysian Islamic banks and 5 Indonesian Islamic banks with 10 distress episodes. Distress episode refer to the crises period that determined by Laeven & Valencia (2012). After re-estimate the logit equation, Model B in Table 4 below shows that all the coefficients retain their significance and sign. In addition, it able to predict the occurrence of financial crisis at 87 percent. For in-sample prediction, Model A below was estimated using 241 observations with 10 distress episodes and able to predict crisis correctly about 88 percent.

Based on Model B in Table 4 below, PF remain consistent with 20 percent less likely to have crises compared to debt-based financing. It consistent with the existing theory which stated that PF (20 percent) able to prevent Islamic bank from the crisis (Chazi & Syed, 2010; Hassan & Dridi, 2011). Then, banks with higher M2RES are 28 percent less likely to have crises (Kaminsky & Reinhart, 1999; Demirguc-kunt & Detragiache, 1998 and Demirguc-kunt & Detragiache, 2005). Bank with higher economic freedom are 20 percent more likely exposed to the crises. High economic freedom leads to greater bank fragility, therefore, increase vulnerability for bank having financial crisis (Barrell et al., 2010; Beck, Demirguc-Kunt, & Levine, 2006). Besides, bank with lower rate of GDP (YG) are 10 percent more likely to have crisis. Bank with higher market concentration are 0.006 percent more likely to have crisis. In a perfect market, bank concentration may imply more market power for banks, involving higher interest rates and lower availability of funds and thus expose bank to higher probability of crisis. Finally, high inflation is 4 percent more likely to have crisis in compared to those with lower inflation (Barrell, Davis, Karim and Liadze ,2010; Kassim and Abd Majid ,2010; Mannasoo and Mayes,2009; Duttagupta and Cashin, 2008; Kaminsky & Reinhart, 1999 and Demirguc-kunt & Detragiache,1998).

TABLE 4: In -sample prediction and out - of sample prediction

Variables	Model 1				Model 2			
	Coef.	P>z	Marginal effect	P>z	Coef.	P>z	Marginal effect	P>z
PF	-1.73	0.05	-0.17	0.03	-2.09	0.06	-0.20	0.05
ECOFREE	-0.17	0.06	-0.02	0.02	-0.23	0.05	-0.02	0.04
M2RES	-1.79	0.00	-0.17	0.02	-2.91	0.01	-0.28	0.02
YG	-0.77	0.00	-0.08	0.01	-1.06	0.01	-0.10	0.09
HHI	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.05
INFL	0.44	0.00	0.04	0.01	0.39	0.03	0.04	0.09
constant	19.26	0.00			27.81	0.00		
Log likelihood	-68.45				-37.03			
Pseudo R2	0.49				0.55			
Correctly classified crisis	0.88				0.87			
Observation	241				144			

CONCLUSION

The main objective of this study to estimate the effect of PF on Islamic banking during financial crises using the logit model in EWS. Our model is almost accurate as it is able to predict crisis about 88%, consistent and stable. The result suggest that PF element is expected to reduce the probability of crises in Islamic banks. For the supervision variable, an increase in economic freedom implies that the banks that are less supervised tend to have higher chances of crises. Our finding demonstrated that bank with higher M2/ reserve and GDP growth are significantly has a beneficial impact of reducing crisis probability. Meanwhile for higher market concentration and inflation are more likely to expose bank to have crises. The validity of the model has been tested

for out-of-sample observations. The result shows that all the coefficients retain their significance, sign and magnitude. The model is able to predict crisis at 87%. Therefore, it indicates that our model is consistent and stable.

The implementation PF as one of the effective strategies for Islamic banks to remain stable during financial crises. Islamic banks should place greater emphasize on PF which are Mudharabah and Musyarakah in their financing scheme to ensure the stability of banking sector. Notwithstanding the finding of the current research, the study is still subject to limitation. A larger sample may depict a better view of the crisis determinants for Islamic banks.

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