

Ownership Structure and Risk Taking of Malaysian Banking Institutions: A Comparative Measurement Applied in Developed and Emerging Countries

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This research aims to investigate the comparative measurement impact of the three ownership structures (government, institutional and family) on bank risk takings measured by Z-Score with capital adequacy ratio as the moderating element towards bank risk taking as measured by Z-Score, along with the five control variables. There are two Z-Score measurement used in this study. The first Z-Score measurement is used to measure risk taking in developed countries, meanwhile the second Z-Score is the formulation that is used and is based on the context that fits for Malaysia as one of the emerging markets. Data from eight Large Domestically-owned Commercial Banks in Malaysia for the period that ran from 2000 to 2012 is used in this research. Hierarchical moderated multiple regression results suggest that capital adequacy is significant as a moderating factor merely for the second measurement of bank risk. Besides, the interaction between family ownership and capital adequacy are also found to be significant only towards risk taking for the second measurement of the bank risk.

Key words: *Ownership structure, risk taking, banking, Z-Score, capital adequacy ratio, emerging.*

Introduction

Two clear messages from the corporate governance literature show that ownership is important and that it is helpful to view the issue in the context of the principal-agent framework and public choice theory (Altunbas et al. 2001). However, while that literature has provided considerable understanding of the effects of ownership, its primary focus is basically on non-financial firms. The separation of owner (financial provider) from decision maker (manager) creates agency problem between these two entities in the firm. Agency problems arise when shareholders yearn for capital return while the decision maker may misappropriate the shareholders' investment. Agency problem is a source of inefficiency because it explains why environmental pressures, which influence the responses and effort of management, may fail to coerce maximal effort from managers.

According to Levine (2004), principal-agent problems in banks may raise the issues attributable to what is the most appropriate governance structure for banks. The complicated issue of bank governance is caused by several factors such as the quality of bank regulations and supervision, the opaqueness of bank assets, the level of market development, and the institutional environment which conditions the overall effectiveness of financial markets. Iannotta et al (2007) argue that a firm's ownership structure can be defined along two main dimensions. First, the degree of ownership concentration; firms may differ because their ownership is more or less dispersed. Next, the nature of the owners; given the same degree of concentration, two firms may differ if the government holds a majority stake in one of them, such as for example, a stock firm with dispersed ownership is different from a mutual firm.

Bank stability has yet again been the topmost agenda item for policy makers' across advanced developing countries. This has been a concern since the beginning of the 1997-1998 Asian financial crisis, and for the past few years there have been numerous debates around the world as to the stability of banks of different sizes and ownership (Beck et al 2009; Polat, 2018). For the past two decades, Malaysia has experienced two financial crises namely; Asian Financial Crisis in 1997-1998 and the Global Financial Crisis in 2008-2009. The 1997/1998 Asian Financial Crisis was been found to be more severe and left a bigger impact on the Malaysia banking industry as compared to the 2008-2009 Global Financial Crisis. As per Beck et al. (2003) the occurrence of the banking crisis is due to banking fragility, whereby crises are less likely in economies with more concentrated banking systems. This is because the profits enhanced by the concentrated banking systems result in lower bank fragility. The same issue also has been discussed in (Beck et. al 2006).

The aim of this research is to investigate the ownership structure as a mechanism for analysing the determinants of Malaysian bank risk taking. A comparative measurement of bank risk taking applied in developed and emerging countries is analysed. The main motivating factor of

this study is the effect of the 1997/1998 economic crisis. In addition, prior to the situation, the poor bank governance was more severe than that of non-bank firms and their failures had even more significant costs. This is due to banks being considered unique economic units because of their distinguishing roles in financial intermediation, in payment system, liquidity, information and maturity and denomination transformation. In line with this, banks are also important as they provide critical monitoring role in the governance of their borrowers such as reducing borrowers' earnings management behaviour as suggested by Ahn & Choi (2009).

Pathan (2009) notes the importance of studying bank risk-taking today is far more important than ever before due to the constant attempt of legislation revision. All the attempts by the policy makers facilitate a better monitoring of bank activities which includes the bank risk taking behaviour. Further, the financial shocks in the US such as the sub-prime mortgage crisis in August 2007 due to irresponsible risk-taking by the financial institutions, do initiate the economy at risk. As a result, it is crucial to study bank risk taking. In addition, this study also attempts to investigate the importance of capital adequacy ratio (CAR) as a moderating factor between the ownership structures with the bank risk takings. Capital adequacy ratio (CAR) is the ratio of a bank's capital to its risk.

The remainder of this paper is organized as follows. Section 2 presents an overview of the literature on bank ownership and risk taking. Section 3 describes the data and methods employed, Section 4 discusses the results, and finally Section 5 concludes the findings.

Literature Review

The banking system is the primary mobiliser of funds and also the main source of financing that supports the economic activities in Malaysia. It comprises of commercial banks, investment banks and Islamic banks. In this study, the focus is on the eight domestically-owned commercial banks in Malaysia. This is due to their importance as the largest group of commercial banks and most significant providers of funds in the banking system. Furthermore, commercial banks have the largest share of the market. The classifications of the eight commercial banks are as provided in Table 1.

Table 1: The Classification of the Three Main Group of Commercial Banks

Family Owned Banks	Government Owned Banks	Corporate Owned Banks
AMMB	Affin	Alliance Bank Berhad
HLB	CIMB	
Public Bank	Maybank	
RHB		

The worsening situation that have been prompted in some of the banking institutions in the early 1998 has initiate the Malaysia government for a sudden decision for a bank merger programme in 1999 in order to consolidate the banking industry as some banking institutions faced difficulties due to their substantial losses and the increase of NPL ratios (Lum & Koh 2007; Puteri, 2018).

A robust bank merger programme was initiated by the government in July 1999 in order to restructure all domestic banking institutions into six banking groups (Lum & Koh 2007). Referring to the Bank Negara Malaysia annual report 2001, there are ten lead anchor banks namely; Affin Bank Group, Alliance Bank Group, Arab Malaysia Bank Group, Bumiputra-Commerce Bank Group, EON Bank Group, Hong Leong Bank Group, Malaysian Banking Group, Public Bank Group, RHB Bank Group and Southern Bank Group. The composition of the ownership structure in the merged banking groups and the market structure of the banking industry usually changes due to the consolidation of the banking industry. The Malaysian government's strategy in the post-crisis years is to consolidate the banking industry (Lum & Koh 2007).

The proper management of risk is through good corporate governance mechanisms which provide a framework of disclosure that allows the market to discern the risk choices of the banking institutions. It must entail greater transparency and market discipline in order to be effective (Lum & Koh 2007). As for the Malaysian banking sector, the changes in the ownership structure has been an important feature of the evolution. In Malaysia, the bank ownership structure implies a high concentration of shareholding by ownership types. The BAFIA was a clear and robust regulatory response to the crisis of the mid-1980s, which came into force on October 1, 1989.

As per Section 46 of BAFIA 1989, all banks are required to institutionalize their shareholding structure by restricting ownership in a bank by restrictive the limit of equity ownership by individual companies in bank to no more than 20 per cent as per the Banking act of 1973. On the other hand, the equity owned by family-owned company or an individual is restricted up to 10 per cent. However, it does seems to have any significant effect on the composition of ownership structure in the banking industry even though the consolidated programme have resulted in larger and better capitalized domestic banking institutions.

Referring to the theoretical and empirical literature, the nature of the shareholders does influence the different of agency problems and the risk-taking behaviour. The identified issue raised by Jensen and Meckling (1976) is the conflict of interest between managers and shareholders. In line with this, the theory indicates that shareholders with a diversified portfolio are motivated to take more risk for a higher expected return whereas managers take less risk to

protect their position and personal benefits and to preserve their acquired human capital Galai and Masulis (1976), Jensen and Meckling (1976), Demsetz and Lehn (1985), Esty (1998).

Referring to Galai and Masulis (1976), Esty (1998), Jensen and Meckling (1976), Demsetz and Lehn (1985), the agency theory indicates that shareholders with a diversified portfolio are motivated to take more risk for a higher expected return whereas managers take less risk to protect their position and personal benefit, and preserve their acquired human capital. The first to test empirically and relationship between banks' ownership structure and their risk taking incentives is by (Saunders, Strock, & Travlos, 1990). Moreover, from the findings also reveal that the banks controlled by shareholders tend to take more risk compare to banks controlled by managers. Based on these findings it motivates to undergo for this research.

Based on theory of risk taking it predicts that banks with large dominating shareholders, in other words, with easy control over management, tend to take more aggressive risks than managers who dominated banks with small disperse shareholdings. Prior studies, in the case of banking found that the existence of large shareholders increases bank risk taking (Ciancanelli and Gonzalez, 2000; Iannotta et al., 2007; John et al., 2008). The level of risks in banks which refer to bank risk taking, is measured by insolvency risk (Barry et al. 2011; Quinones & Hunter Jr 2017). Bank insolvency problems reveal the degree of exposure to losses or failures which will reduce bank capital reserves that could be used to offset adverse shocks. Bank insolvency risk indicates the banks' distance from failure and is measured using Z-Score. A lower (negative) Z-Score indicates a riskier bank, whereas a higher (positive) Z-Score implies a more stable or the bank is safer. The predictions by Saunders et al. (1990) and Laeven and Levine (2006) that banks with large dominating shareholders take larger risks than manager-dominated banks with small shareholdings.

Empirical studies on the effect of ownership on bank risk takings provide mixed results. Ownership concentration positively affects bank's risk taking (Laeven & Levine 2009). Besides, banks with concentration ownership tend to have better loan quality, lower asset risk and lower insolvency risk (Iannotta et al 2007). However, Shehzad, de Haan, and Scholtens (2010) on the other hand, suggest that in order for the result to be different, is by a higher levels of ownership concentration with capital adequacy ratio as the proxies for risk. As the result, the effect of ownership concentration is positive and in a better risk-weighted capitalization with the capital adequacy ratio as the proxy of the bank risk.

The impact of ownership structure on risk with CAR

According to Naceur and Kandil (2009), since the response of choice by a non-risk averse consumer will be towards a riskier asset, the distribution of risk aversion across banks is due to the effect of capital requirements on the overall banking system. The potency of more capital

at risk through capital requirement enables the internalized efficiency of investing in high risk assets. In addition, the situation will also reduce the capitalized value of expected future profits which is referring to the reduction of the banks' franchise values.

According to Naceur and Kandil (2009), the banks' capital ratio decisions are significantly affected by the capital requirements. Also, the regulatory pressure did positively affect their chosen risk levels, although it did not induce banks to increase their capital requirement. As per Shehzad et al. (2010), the capital adequacy ratio positively affected by ownership concentration, and as the result ownership concentration reduces the bank riskiness and this can be measure by Z-Score. On the other hand, referring to Dolde and Knopf (2006), ownership structure is associated with higher risk and is also associated with higher returns.

The argument raised by Ciancanelli and Reyes-Gonzalez (2000) is that capital requirements avoid expropriation problems between shareholders and bank creditors. Referring to La Porta, Lopez-De-Silanes, and Shleifer (1999) and Rime (2001), capital requirement reduces incentives for high risk taking in banking as shareholders are forced to absorb a larger part of the losses. In support of the findings, Konishi and Yasuda (2004) found that the implementation of high capital requirement reduced bank risk. This indicates and suggests a negative significant relationship between high capital requirement and bank risk taking. In addition, this suggests that the implementation of high capital requirement is important in reducing bank risk.

Referring to Laeven and Levine (2009) , the ownership stakes to consider consist of ten per cent and twenty per cent with the Z-Score as the bank risks. However, Shehzad et al. (2010) on the other hand, suggest that in order for the result to be different, is by a higher levels of ownership concentration with capital adequacy ratio as the proxies for risk. As a result, the effect of ownership concentration is positive and in a better risk-weighted capitalization with the capital adequacy ratio as the proxy of the bank risk. Based on prior studies, the current study predicts positive moderation association by capital adequacy ratio between ownership structure and risk.

H1 : CAR positively intervenes in the relationship between ownership structure and risk

Methodology

The data used in this study consists of annual ownership and financial data for the eight listed commercial banks in Malaysia during the years 2000-2012. The banks included in the sample are AMMB, HLB, Public Bank RHB, Affin, CIMB, Maybank and Alliance Bank. The data have been gathered from annual reports of the banks, Thomson Financial Datastream data services and Bureau Van Dijk Bankscope. Usable data for analysis begins from 2000-2012 due to the bank merger and acquisition process completed by 2001. Thus, in order to test both of

the models in this research; a balanced panel of data is constructed by collecting yearly data from 2000 until 2012 of eight domestically-owned commercial banks in Malaysia which consists of 104 observations. Bank risk takings are measure by Z-score and are presented below:

In this research, in order to meet the context of emerging market and as proposed by Bank Negara Malaysia regarding the more appropriate measurement of Z-Score is based on the measurement as per prior research by (Altman 2005). As for this research, Z-Score¹ value is calculated as:

$$Z\text{-SCORE} = 3.25 + 6.56 (\text{Working Capital} / \text{Total Asset}) + 3.26 (\text{Retained Earnings} / \text{Total Asset}) + 6.72 (\text{Operating Income} / \text{Total Asset}) + 1.05 (\text{Equity} / \text{Total Asset})^1$$

As per in the above Z-SCOREEM model, the constant term of the model is been derived from the median Z-Score for the bankrupt US entities. Based on the constant term, do enables to standardize the analysis so that a default equivalent rating (D) is consistent with a score below zero, whereby rated D actually scores below 1.75 (Altman 2005). On the other hand, the comparison value of Z-Score calculated in this research as such;

$$Z\text{-SCOREDM} = (ROA + CAP) / S$$

whereby,

$$ROA = \text{EBIT} / \text{Total Assets}$$

$$CAP = \text{Equity capital to asset ratio}$$

$$S = \text{Standard deviation of ROA}$$

The Z-ScoreDM is measured as ROA (pretax return on assets) plus Cap (equity capital to asset ratio and divided by *s* (the standard deviation of ROA). Five years of data are used in computing the standard deviation of ROA. As for example, in computing the standard deviation of ROA for 2000 is computed by taking the ROA data from 1996-2000 standard deviation of ROA for 2012, is computed by taking the ROA data from 2008-2012 and so on. The measurements also have been used by Lopezpuertas-Lamy and Gutierrez (2012) to measure the Z-Score. A higher Z-Score indicates that the bank is more stable. As per Laeven and Levine (2009), high risk banks might form concentrated ownership if diffuse shareholders have difficulty monitoring risky investments. Hence, almost all banks are controlled by a small group of majority shareholders also known as concentrated ownership.

As per Laeven and Levine (2009) who find that banks with more powerful owners tend to take greater risks, this is consistent with the theories predicting that equity holders have stronger

¹ Bank Negara Malaysia proposed more appropriate measure of Z-Score in the context of emerging market. This formulation is based on Altman (2005).

incentives to increase risk than non-shareholding managers and debt holders and that large owners with substantial cash flows have the power and incentives to induce the bank's manager to increase risk taking. Ownership-specific determinants of risk taking behaviour are government ownership, institutional ownership and family ownership are employed in this study. The ownership structure is based on the total accumulation percentage of top 30 shareholders which are gain from the annual reports of the eight banks from 2000 to 2012.

In addition, bank size (BNKSIZE), leverage (LVRG), loan quality (LOANQ), deviation from traditional banking activities (DEVTBA) and management efficiency (MGMTEFF) are employed as control variables. Finally, capital adequacy ratio (CAR) is included as the moderating variable. Bank size (BNKSIZE) is represented by the natural logarithm of bank total assets. Following Lee et al. (2008), bank's leverage (LVRG) is measured by capital to asset ratio, and leverage value is represented by the ratio of total debt to common equity. Capital adequacy requirements set by central banks are intended to reduce bank insolvency risk is calculated by the ratio of total capital to risk weighted assets of banks.

The level of loan loss provisioning ideally according to Dugan (2009) should be able to reflect the beliefs of banks management on the quality on the loan portfolio that they have. Loan quality (LOANQ) is calculated as the ratio of provision of loan loss to total asset adopted as proposed by (Hassan, 1993): Referring to DeYoung (2012), traditional banking activities had neither a positive or negative effect on the bank failure. Deviation from traditional banking activities (DEVTBA) is measured by the ratio of non-interest income to total asset as proposed by Madura, Martin, & Taylor(1994). The bank is said to be using its assets more effectively, as the greater a bank's earnings in proportion to its assets. As for this research, management efficiency (MGMTEFF) is calculated as the ratio of total earning asset to total asset as prior research by Angbazo (1997). Hierarchical moderated multiple regression is used to access the effects of a moderating variable which in this research is the capital adequacy ratio (CAR). As for the hierarchical moderated multiple regression, it is required to enter the three ownership structure variables, the control variables and the moderating variable on the first step and then the interaction terms along with the former variables in the second step. The framework for Model 2 is depicted in Figure 1.

The impact of ownership structure on risk with CAR

Model 1a

$$\begin{aligned}
 \text{Z-ScoreDM} = & \beta_0 + \beta_1\text{GOVOWN}_{it} + \beta_2\text{INSTOWN}_{it} + \beta_3\text{FAMOWN}_{it} + \beta_4\text{CAR}_{it} \\
 & + \beta_5\text{BNKSIZE}_{it} + \beta_6\text{LVRG}_{it} + \beta_7\text{LOANQ}_{it} + \beta_8\text{DEVTBA}_{it} \\
 & + \beta_9\text{MGMTEFF}_{it} + \sum_{j=1}^7 \gamma_j \text{DB}_j + e_{it}
 \end{aligned}$$

(2)

Model 2a

$$\begin{aligned} Z\text{-ScoreDM} = & \beta_0 + \beta_1\text{GOVOWN}_{it} + \beta_2\text{INSTOWN}_{it} + \beta_3\text{FAMOWN}_{it} \\ & + \beta_4\text{GOVOWN}*\text{CAR}_{it} + \beta_5\text{INSTOWN}*\text{CAR}_{it} + \beta_6\text{FAMOWN}*\text{CAR}_{it} \\ & + \beta_7\text{CAR}_{it} + \beta_8\text{BNKSIZE}_{it} + \beta_9\text{LVRG}_{it} + \beta_{10}\text{LOANQ}_{it} + \beta_{11}\text{DEVTBA}_{it} \\ & + \beta_{12}\text{MGMTEFF}_{it} + \sum_{j=1}^7 \gamma_j DB_j + e_{it} \end{aligned}$$

(3)

Where, Z-ScoreDM is Z-Score measurement used in developed countries, GOVOWN, INSTOWN and FAMOWN are ownership structure variables and (CAR) is the capital adequacy ratio. BNKSIZE, LVRG, LOANQ, DEVTBA and MGMTEFF are the control variables. DB_j is a bank dummy variable as defined previously. Finally, as for the second step of the hierarchical regression, represented by Model 3, the interaction variables between the three independent variables and the moderating variable (CAR) are included in the regression. This model assumes that capital adequacy ratio (CAR) as moderating variable has an impact on the dependent variable; Z-Score, through its interaction with the independent variables.

Model 1b

$$\begin{aligned} Z\text{-ScoreEM} = & \beta_0 + \beta_1\text{GOVOWN}_{it} + \beta_2\text{INSTOWN}_{it} + \beta_3\text{FAMOWN}_{it} + \beta_4\text{CAR}_{it} \\ & + \beta_5\text{BNKSIZE}_{it} + \beta_6\text{LVRG}_{it} + \beta_7\text{LOANQ}_{it} + \beta_8\text{DEVTBA}_{it} \\ & + \beta_9\text{MGMTEFF}_{it} + \sum_{j=1}^7 \gamma_j DB_j + e_{it} \end{aligned} \quad (2)$$

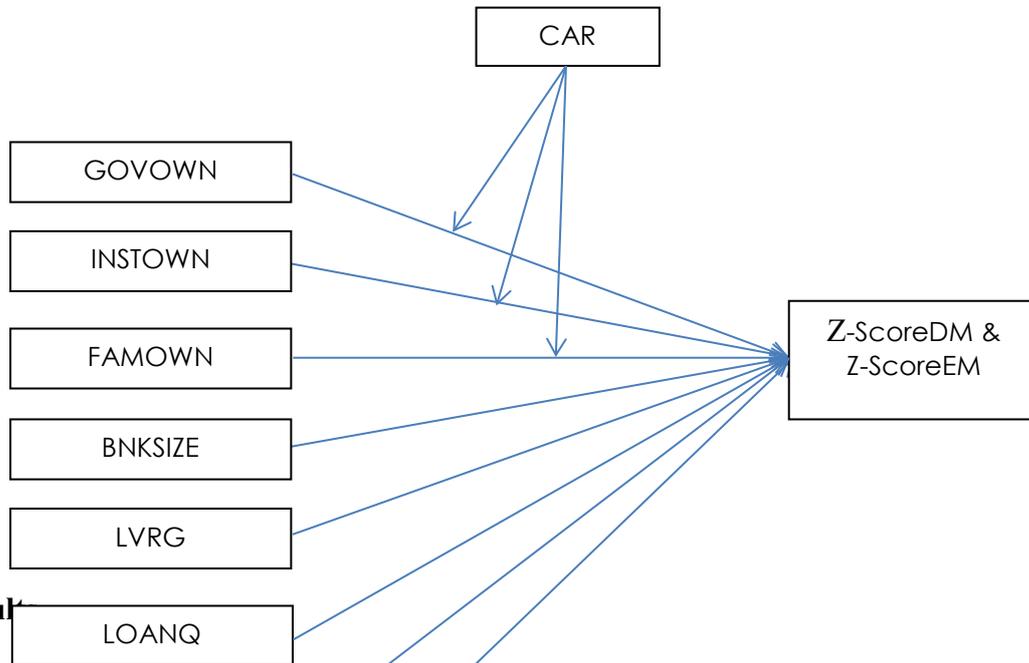
Model 2b

$$\begin{aligned} Z\text{-ScoreEM} = & \beta_0 + \beta_1\text{GOVOWN}_{it} + \beta_2\text{INSTOWN}_{it} + \beta_3\text{FAMOWN}_{it} \\ & + \beta_4\text{GOVOWN}*\text{CAR}_{it} + \beta_5\text{INSTOWN}*\text{CAR}_{it} + \beta_6\text{FAMOWN}*\text{CAR}_{it} \\ & + \beta_7\text{CAR}_{it} + \beta_8\text{BNKSIZE}_{it} + \beta_9\text{LVRG}_{it} + \beta_{10}\text{LOANQ}_{it} + \beta_{11}\text{DEVTBA}_{it} \\ & + \beta_{12}\text{MGMTEFF}_{it} + \sum_{j=1}^7 \gamma_j DB_j + e_{it} \end{aligned}$$

(3)

Where, Z-ScoreEM is Z-Score measurement used in emerging countries, GOVOWN, INSTOWN and FAMOWN are ownership structure variables and (CAR) is the capital adequacy ratio. BNKSIZE, LVRG, LOANQ, DEVTBA and MGMTEFF are the control variables. DB_j is a bank dummy variable as defined previously. Finally, as for the second step of the hierarchical regression, represented by Model 3, the interaction variables between the three independent variables and the moderating variable (CAR) are included in the regression. This model assumes that capital adequacy ratio (CAR) as moderating variable has an impact on the dependent variable; Z-Score, through its interaction with the independent variables.

Figure 1. Model 1 Framework



Result

Summary of the sample descriptive statistics of ownership structure variables, risk measure, mode control variables for the overall sample for the eight commercial banks are presented in table 2. Total number of observations in this study for each variable is 104, which is a panel data of eight cross sections (i.e. commercial banks) and time series. Panels of data are all balanced with no missing data. For the ownership –structure, INSTOWN has the largest mean with value of 51.85 per cent, followed by GOVOWN (13.69 per cent) and FAMOWN (7.67 per cent).

The mean for the moderating variable (CAR) is 14.65 percent, with maximum of 23.8 per cent and minimum of 11.55 per cent which are all above the capital requirement of 8 percent as set by the central bank BNM. On the other hand, Z-Score with the mean value of 4.11 and maximum of 4.69 indicate that the sample of the banks are stable in term of insolvency risk and are in the range of a safe zone. On the other hand, the minimum Z-Score of 2.68 indicates that the affected banks are in a range of grey zone. None of the banks in the sample are in the distress zone.

Table 2: Descriptive Statistics for the Variables of the Research

	Mean	Median	Max	Min	Std.Dev.	Observ.
GOVOWN	0.1369	0.0881	0.8166	0.0000	0.1517	104
INSTOWN	0.5185	0.5467	0.8838	0.0891	0.2137	104
FAMOWN	0.0767	0.0054	0.3364	0.0000	0.1022	104
BNKSIZE	18.1713	18.166	20.0171	13.969	0.8958	104

LVRG	2.1329	1.7477	8.7467	0.2541	1.4942	104
LOANQ	0.0069	0.0065	0.0307	-0.0009	0.0053	104
DEVTBA	0.0097	0.0089	0.0443	0.0011	0.0049	104
MGMTEFF	0.0086	0.0095	0.0162	-0.0211	0.0052	104
CAR	0.1465	0.1449	0.2380	0.1155	0.0207	104
Z-ScoreDM	13.9317	10.345	77.5035	0.1436	13.0164	104
Z-ScoreEM	4.1099	4.137	4.6848	2.6792	0.3066	104

Results of the regression analysis on Model 1 and Model 2 are presented in Table 3. The F-statistics of models 1a and 2a suggests that these models are statistically not significant meanwhile, both models 1b and 2b are statistically significant.

Model 1a examined whether capital adequacy ratio (CAR) is added as a moderating variable. The results show that CAR is positively significant at 1 percent level on risk taking of banks. Besides, bank size (BNKSIZE) and leverage (LVRG) are the two control variable that are found to be positively significant and negatively significant, respectively, at 5 per cent level in this model. AMMB retains its significant different from the reference bank, Maybank, in this model. In addition, two other banks, Affin and RHB, are also significant different from the reference bank.

Model 2a examines the interaction effects of capital adequacy ratio on the relationship between ownership structures towards Z-Score. Even though capital adequacy ratio (CAR) is found to be significant as a moderating variable in Model 2, the results from Model 3 shows that capital adequacy ratio (CAR) is found to have a significant effect on the Z-Score only when it interacts with family ownership. Its interaction with the remaining two ownership structures; government and institutional ownership are found to be not significant. As in Model 2, bank size (BNKSIZE) and leverage (LVRG) are the two control variable that are found to be significant in this model and the direction of the relationship is also similar to Model 2. As for the individual banks, Affin, AMMB and RHB are found to be statistically significant different from the reference bank, Maybank.

Model 1b examines whether capital adequacy ratio (CAR) is added as a moderating variable. The results show that CAR is positively significant at 1 percent level on risk taking of banks. Besides, bank size (BNKSIZE) and leverage (LVRG) are the two control variable that are found to be positively significant and negatively significant, respectively, at 5 per cent level in this model. AMMB retains its significant different from the reference bank, Maybank, in this model. In addition, two other banks, Affin and RHB, are also significant different from the reference bank.

Model 2b examines the interaction effects of capital adequacy ratio on the relationship between ownership structures towards Z-Score. Even though capital adequacy ratio (CAR) is found to be significant as a moderating variable in Model 2, the results from Model 3 shows that capital adequacy ratio (CAR) is found to have a significant effect on the Z-Score only when it interacts with family ownership. Its interaction with the remaining two ownership structures; government and institutional ownership are found to be not significant. As in Model 2, bank size (BNKSIZE) and leverage (LVRG) are the two control variable that are found to be significant in this model and the direction of the relationship is also similar to Model 2. As for the individual banks, Affin, AMMB and RHB are found to be statistically significant different from the reference bank, Maybank.

Table 3: Regression Results for the Models

Variables	Model 1a Z-ScoreDM	Model 2a Z-ScoreDM	Model 1b Z-ScoreEM	Model 2b Z-ScoreEM
Intercept	-109.1873 (-1.536096)	-206.0756 (-1.978114)*	0.819497 (0.598115)	3.015788 (1.515243)
GOVOWN	4.272107 (0.154953)	60.08668 (0.542644)	-0.193856 (-0.364779)	-2.232549 (-1.055344)
INSTOWN	7.823487 (0.277023)	106.7940 (1.393809)	-0.223298 (-0.410195)	-2.344772 (-1.601819)
FAMOWN	-51.22168 (-0.980248)	246.6848 (1.150838)	-0.749845 (-0.744466)	-8.504461 (-2.076707)**
CAR	-98.42446 (-1.438598)	412.0674 (1.019059)	5.421393 (4.110912)***	-7.362728 (-0.953074)
BNKSIZE	6.597963 (1.942094)*	7.074837 (1.950724)*	0.136964 (2.091497)**	0.135293 (1.952590)*
LVRG	-0.490194 (-0.419967)	-0.102826 (-0.084927)	-0.044935 (-1.997190)**	-0.055547 (-2.401371)**
LOANQ	16.05416 (0.037953)	53.39530 (0.125269)	1.288104 (0.157981)	0.618301 (0.075927)
DEVTBA	-1.944844 (-0.004850)	237.0200 (0.545361)	6.462066 (0.835985)	0.247951 (0.029862)
MGMTEFF	458.6738 (1.098121)	374.5738 (0.885787)	7.545945 (0.937240)	9.472418 (1.172491)
GOVOWN*CAR		-259.1399 (-0.320300)		11.66694 (0.754808)

INSTOWN*CAR		-600.1462 (-1.287962)		12.75250 (1.432511)
FAMOWN*CAR		-1888.017 (-1.409676)		49.21807 (1.923510)*
Affin	32.47962 (2.562257)**	31.06408 (2.361571)**	0.448319 (1.834804)*	0.513295 (2.042521)**
Alliance	19.66755 (1.852690)*	21.14061 (1.880499)*	0.160893 (0.786286)	0.170613 (0.794371)
AMMB	5.222468 (0.862925)	7.638338 (1.197892)	0.520683 (4.463354)***	0.475960 (3.907025)***
CIMB	4.298577 (0.824810)	4.464664 (0.853409)	0.145787 (1.451236)	0.141106 (1.411793)
HLB	18.20668 (2.189966)**	20.05044 (2.267810)**	-0.224562 (-1.401309)	-0.234849 (-1.390363)
PBB	24.07732 (1.996262)**	28.64069 (2.209405)**	0.050746 (0.218273)	-0.041611 (-0.168018)
RHB	7.466807 (1.167913)	8.520352 (1.296233)	0.222102 (1.802268)*	0.212568 (1.692703)*
Adj. R ²	0.230816	0.225364	0.485061	0.490561
F-Statistics	2.931756	2.577137	7.063976	6.220175
N	104	104	104	104

Note: ***, **, * are significant at 1, 5, and 10 percent significance levels, respectively.

Discussion

Implication of ownership structure towards bank risk taking

Although none of the ownership structure and the approach have significant impact towards the bank risk taking measured by Z-ScoreDM, PBB is found to be significant towards Z-ScoreDM. The situation is due to the institutional ownership structure is found to be significant towards Z-ScoreDM and the fraction of institutional ownership in PBB is high throughout the years. This indicates that the bank risk taking measured by Z-ScoreDM approach is not the best approach portraying in the relationship between the ownership structure and bank risk taking for the commercial banks. However, the bank risk taking approach in Z-ScoreEM, which is significant found that even though the three ownership structures are not significant and relevant towards Z-ScoreEM, Maybank as the reference bank and two of the family owned banks namely AMMB and HLB are found to be significant towards Z-ScoreEM. Thus, this

imply that ownership structure namely; government, institutional and family ownership structure) are not positively significant in determining the bank risk taking as supported by prior literature and hypothesis.

Implication of ownership structure with capital adequacy ratio towards bank risk taking

It is found that only Z-Score approach in Z-ScoreEM, CAR is significant in intervening in bank risk taking. As for the interaction between ownership structure and CAR, family ownership is found relevant to interaction with Z-ScoreEM. CAR is found to intervene between the relationship of ownership structure and Z-ScoreEM for Affin, AMMB and RHB. The significant between family ownership and CAR is justified by the significant of AMMB and RHB which are classified as the family owned banks. However, Affin as one of the government owned banks is also significant with CAR as the moderating factor towards the bank risk taking measured by Z-ScoreEM. This is a result of the contribution of other control variables in the analysis. Even though two of the interaction variables are not significant towards Z-ScoreEM, thus one can conclude that interaction between CAR and ownership structure is somehow relevant in determining the bank risk taking as measured in Z-ScoreEM although with minimal influence.

The findings of this study provide insight and understanding of the role of ownership structures namely; government ownership, institutional ownership and family ownership in determining the risk taking of commercial banks in Malaysia. It is found that in determining the Z-Score for the commercial banks in Malaysia, the Z-ScoreEM approach is more appropriate in determining the direct relationship of ownership structure and Z-Score as well the relationship between ownership structure towards Z-Score with CAR as the moderating variable, control variables and interaction variables. Moreover, the model used in the direct relationship of ownership structure with Z-ScoreEM and the more complex models of Z-ScoreEM are significant and have more explanatory power compared to the approach used in measuring the bank risk taking in the developed countries which measured as per Z-ScoreDM measurement. The findings in Model 3e of Z-ScoreEM are that capital adequacy ratio positively intervenes on the relationship between ownership structure and Z-Score. From the findings, it is interpreted that only family ownership positively interacts with capital adequacy ratio and is towards Z-Score. The finding infers that increase in family ownership increases bank stability which is represent by Z-ScoreEM, which implies a decrease in the risk taking of the banks.

In addition, this research also contributes to the knowledge of how the three main groups of commercial banks (family owned banks, government owned banks and institutional owned banks) which comprise 8 banks; (Affin, Alliance, AMMB, CIMB, HLB, Maybank, PBB and RHB) with the two Z-Score measurement function (Z-ScoreDM and Z-ScoreEM). This is through the direct effect between the three ownership structures towards the bank risk taking

as well as the effect between the three ownership structures towards the bank risk taking along with the moderating variable, control variables and interaction variables.

In conclusion, the fraction of shareholding in the bank is important regardless of the classification type of the bank (government owned bank, institutional banks and family owned banks). Also, there is a need to consider the changes in shareholding throughout the research period which could contribute to the results and findings. As a consequence, the findings in the research might differ and might not be as per the prior research prediction which is attributable to this matter. In addition, the movement of capital adequacy ratio does affect the bank performance as well as the bank risk taking.

Conclusion

Ownership structure is not found to be significant in direct relationship towards Z-Score. However, capital adequacy ratio (CAR) is found to be significant as a moderating variable towards Z-Score. This is consistent with the findings by Shehzad et.al, (2010). FAMOWN*CAR is found to be a significant factor and this is consistent with the hypothesis prediction whereby CAR positively intervenes in the relationship between ownership structure and bank risk taking. (BNKSIZE) is found to be significant in models 2 and 3, but is also found to have positive affect towards Z-Score. This is not consistent with the findings by Srairi (2013), where bank size and bank risk taking was expected to be negatively related.

In addition, leverage is found to be significant towards Z-Score. However, the result does not support the findings by Papanikolaou and Wolff (2010), that there is a significant positive relationship between leverage and bank risk taking. Management efficiency (MGMTEFF) is found to be in positive direction in the hierarchical models. However, MGMTEFF are found not significant towards Z-Score As for the deviation from traditional banking activities (DEVTBA) and loan quality (LOANQ) these are found not significant for bank risk taking in models 2 and 3. The results also show that the preferences for risk taking in the commercial banks in Malaysia are affected not only due to the different type of ownership but also due to the moderating factor of capital adequacy ratio regardless of the directions of the relationship.

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