

BANK RISK TAKING BEHAVIOUR IN MALAYSIA: ROLE OF BOARD AND OWNERSHIP STRUCTURE

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ABSTRACTS

This paper examines the role of board structure and ownership concentration on bank risk-taking of public listed commercial banks in Malaysia from 2001 to 2012. The study focuses on the bank-risk taking behaviour after the major bank consolidation in Malaysia in year 2000. Using two-market model to estimate the risk of the commercial banks in Malaysia, the results suggest that higher ownership concentration and larger board size resulted in higher bank risk-taking of the listed commercial banks in Malaysia. Given that the board structure is an important element of bank risk-taking, regulators should continue to enhance the monitoring of banks (where board size is large and ownership concentration is high) to control the banks' potential for excessive risk taking.

Keywords: bank-risk taking, corporate governance, board structure, ownership concentration, commercial banks

INTRODUCTION

Corporate governance issues received considerable attention in Asian with no exceptional for Malaysia following 1997 Asian Financial Crisis (Cheung & Chan, 2004). The Malaysian banking industry was severely affected with evidence of tremendous increased domestic interest rates, increased outflows of ringgit funds, tight liquidity conditions, increased loan provision requirements and high borrowers default (due to sharp falls in the value of real estate and equities which

Publication date: 28 February 2018

To cite this article: Loh, L., & Chan, S.-G. (2017). Bank risk taking behaviour in Malaysia: Role of board and ownership structure. *Asian Academy of Management Journal of Accounting and Finance*, 13(2), 1–26. <https://doi.org/10.21315/aamjaf2017.13.2.1>

To link to this article: <https://doi.org/10.21315/aamjaf2017.13.2.1>

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were used as bank collaterals) following large devaluation of the Malaysian ringgit and the plunge of the Kuala Lumpur Stock Exchange (Takatoshi & Yuko, 2007). This had resulted in sharp increase in the non-performing loans from 3.6% as at June 1997 to 9.0% at the end of 1998 (Takatoshi & Yuko, 2007).

Following the 1997 Asian Financial Crisis, Malaysia's central bank (or Bank Negara Malaysia) focused its effort on consolidating the domestic banks in an effort to restore the financial stability as the financial sector plays an important role in the economy (Bank Negara Malaysia, 2001). The central bank's longer-term goal is aimed towards building a domestic banking sector that is resilient and competitive (Bank Negara Malaysia, 2001). By 2001, 50 out of 54 domestic banks were consolidated into 10 banking groups, and 94% of the total assets of the domestic banking sector were rationalised and consolidated (Bank Negara Malaysia, 2001). In addition to the consolidation efforts, Bank Negara Malaysia also implemented various regulatory and supervisory reforms to enhance the strength, capacity and corporate governance of banking institutions, such as issuing guidelines on credit risk management, introducing credit accreditation program, and launching the Enterprise Programme to support viable small and medium scale enterprises, among others (Bank Negara Malaysia, 2001).

In addition, the Finance Committee on Corporate Governance (FCCG) was formed in March 1998 to improve the corporate governance practices in the country (Haniffa & Hudaib, 2006). The FCCG focused on issues of ownership concentration, effectiveness of board of directors, lack of enforcement mechanisms, and lack of responsibilities awareness by directors, among others (Haniffa & Hudaib, 2006). To date the Malaysian Code of Corporate Governance had been revised for three times in view of the importance role of corporate governance in firms' surveillance in long-run.

Theoretically, the important role of corporate governance is widely recognised to overcome the conflict between shareholders and managers such as the agency theory. This is especially true with good board structure and ownership concentration which is believed to contribute positively to more transparent information disclosure about a corporation. Transparency is particularly important in the banking industry as it serves as the main channel for monetary policy transmission of the economy as a whole. Therefore, good corporate practices undeniably contribute towards the stability of a financial ecosystem and the sustainability of an economy.

Failure in the banking system may impede the economic activities and lead to major financial crisis. The Global Financial Crisis is an example of the impact of the financial industry meltdown effecting economies worldwide. Therefore, it

is pertinent that banks lead good corporate practices especially in the composition of board structure and ownership concentration for long-term financial and economy stability. A poor board structure and ownership concentration could drive the market to lose confidence not only in the financial industry but also drive away foreign investments in a country. Hence, this study focuses on the impact of board structure and ownership concentration on risk taking behaviours of the Malaysian banks.

Excessive bank risk taking was viewed as a key factor towards the cause of the Global Financial Crisis in 2007 (Paligorova, 2010). A bank with poor corporate governance could cause the market to lose confidence in the bank, and this could result in a liquidity crisis, which could in turn pose a systemic risk to the country (Htay & Rashid, 2011). Therefore, the risk management of the financial industry plays an important role towards developing a robust and stable economic growth. Krugman (1998) stated that the Asian Financial Crisis was contributed by the domestic banks' structural weaknesses and the economy in Asian countries were further weakened by unsound macroeconomic policies (including low international reserves holdings, low current account balances, weak banking industry and competitive devaluation) and moral hazard. Thus, this study further analysed the role of board composition and ownership concentration on the risk-taking behaviour of commercial banks in Malaysia. This study focuses on equity based risk with the estimation of total risk, market risk and idiosyncratic risk of the banks using two-market model. Unlike previous study of conventional risk taking that focuses on the accounting based risk, we shift our focus into equity based risk because investors and shareholders are more interested in the ability of the banks to diversify the firm-specific risk to reduce their total risk of the banks and to minimise its market exposure. In fact, good corporate governance practices in banks should minimise the market risk of the banks while incurring higher bank specific risk in generating higher return to shareholders based on the risk-return relationship.

This study further adds to the scant of the existing literatures especially after the banking consolidation in Malaysia that takes place since 2001. As there has not been much empirical work done on the board structure and the ownership concentration relationship with bank risk taking in Malaysia especially on equity based risk measures, there is a need to investigate the board structure and ownership concentration factors affecting bank risk-taking in Malaysia from the shareholders and investors perspective which had been largely neglected by the banking authority. This is especially true when the banks are publicly listed. Therefore, this study on bank risk taking using the equity based risk provides a better overview not only to the bank regulators, but also to the shareholders and

investors. This certainly contribute as a guide for monitoring the implementation of continuous measures of corporate governance code of conduct in Malaysia in achieving financial stability. Growth of the banks may affect the risk-taking behaviour and therefore, proper governance practices must be in place to ensure that the industry does not face with the issue of “too big to fail” that would result in the disturbances of the payment system and economic as a whole. This further justifies the need for this study to be conducted.

CORPORATE GOVERNANCE IN MALAYSIA

Poor risk management, weak corporate governance, and excessive lending resulted in large amount of non-performing loans (with average non-performing loans as a percentage of Gross Domestic Product (GDP) reached 20.8% among Indonesia, Thailand, Republic of Korea, Malaysia and Philippines in September 1998) and insolvent banking institutions during the 1997 Asian Financial Crisis (Dadush, Lynn, Riordan, Dasgupta, & Johannes, 1998). The element of poor governance was said to be the main contributor to explain the 1997 Asian Financial Crisis (Zulkafli, Abdul Samad, & Ismail, 2005). As a result, there were a series of reforms in the Corporate Code of Conduct in Malaysia.

Malaysia’s journey on embracing corporate governance began with the establishment of Malaysian Code on Corporate Governance in March 2000 which focused on four areas, i.e. board of directors, director’s remuneration, shareholders and accountability and audit. Under the Malaysian Code on Corporate Governance, companies are encouraged to apply the broad principles of good corporate governance sets out by the code flexibly and applying common sense under various circumstances.

The Malaysian Code of Corporate Governance was subsequently revised in 2007 to strengthen the roles and responsibilities of the board of directors, audit committee and internal audit. In 2012, the Malaysian Code on Corporate Governance 2012 was issued with further emphasis on strengthening board structure and the board’s responsibilities. The Malaysian Code on Corporate Governance 2012 listed eight principles focusing on establishing clear roles and responsibilities of the board, continuous strengthening the board’s composition, reinforcing the board independence, fostering commitment for an organisation’s members, upholding integrity in financial reporting, recognising and managing risks, ensuring timely, and high quality disclosure and strengthening the relationship between company and shareholders (Securities Commission Malaysia, 2012).

The continuous revisions of the Corporate Governance Code of Practice represent the continuous efforts made by the government to improve and raise the corporate governance standard. In addition to the Corporate Governance Code of Practice, Bank Negara Malaysia launched the Financial Sector Master Plan in March 2001 which charts a 10-year plan for the financial industry with the objective of developing a more resilient, competitive and dynamic financial system (Zulkafli et al., 2005). More recently, Bank Negara Malaysia introduced the Financial Services Act 2013 and Islamic Financial Service Act 2013 and one of its key aims was to further strengthen its regulatory and supervisory of the financial institutions. All these efforts are mainly to strengthen the financial industry's corporate governance structure.

In addition, Bank Negara Malaysia introduced the "Guidelines on Corporate Governance for Licensed Institutions" that highlighted the principles of corporate governance with more emphasis on the role of board and management in June 2013 (Bank Negara Malaysia, 2013). The "Guidelines on Corporate Governance for Licensed Institutions" requires licensed institutions to ensure that at least one-third of their board members are independent directors to ensure a strong element of independence on the board and there should be not more than one executive director on the board to maintain effective oversight over management (Bank Negara Malaysia, 2013).

In terms of shareholdings, on average the single largest shareholder and the five largest shareholders of companies in Malaysia were 31% and 62% respectively between the period 1996 to 2000, and this had raised the issues of the protection for minority shareholders (Haniffa & Hudaib, 2006). Most of the companies in Malaysia are highly concentrated and this increases the risk of expropriation from minority shareholders (Khan, 1999). Hence, this motivates us to further study the impact of corporate practices and ownership concentration on risk-taking behaviour of the listed banks in Malaysia. This is because excessive risk-taking resulted in the failure of the banking institutions and also hurt the minority shareholders as they are the entity that received the least protection.

LITERATURE REVIEW

This section reviews the studies on board compositions and ownership concentration in affecting the firms' performance. In the presence of opacity in the banking activities, the boards of directors of the bank play an important role in enforcing effective corporate governance (Leaven & Levine, 2007). Pathan (2009) in his study of the U.S. banks holding companies strongly suggests that strong bank boards with small number of board members and less restrictive

board encourage the banks to take on more risk. This is because strong board of directors are better at representing the bank shareholders' interest and this motivates the bank to take up more risky activities to generate better returns. Similar results are also found by Rachdi and Ameur (2011) in their analysis of the relationship between board characteristics, bank performance and bank risk taking activities based on a sample of 11 large Tunisian commercial banks from 1997 to 2007. This is supported by Sullivan and Hassan (2012) who found that large board reduced the risk taking behaviour of banks based on a sample of 150 bank holding companies from 1999 to 2000 in the United States.

On the contrary, Lipton and Lorsch (1992) and Jensen (1993) found that larger board size resulted in less effective board of directors due to free-rider problems (due to agency problem) as well as difficulty of getting timely decisions. As pointed out by Jensen (1993), board sizes which are above seven or eight members are considered to be ineffective due to the issues of communication and coordination. This will eventually affect the firm's performance. Yermack (1996) found a negative relationship between board size and firm value based on a sample of 452 large U.S. industrial corporations between 1984 and 1991 due to inefficient use of assets.

On the other hand, the role of independent directors cannot be neglected. This is because the independent directors assume the role to oversight and monitor the top management of the firm to maximise shareholders' wealth. The use of independent directors is crucial to resolve the agency problems (Hermalin & Weisbach, 2003). According to Fama (1980) and Fama and Jensen (1983), independent directors are more likely to maintain proper oversight over a firm's top management as they have the incentives to build their reputation as expert monitors. This is in line with Pathan (2009) who found a negative relationship between the percentage of independent directors and bank risk-taking. According to Pathan (2009), this could be due to independent directors view their role as balancing between shareholders' interest and other stakeholders such as regulators and depositors.

Similarly, Htay and Rashid (2011) also found that higher percentage of independent directors would lead to higher risk management information disclosure. On the contrary, Sullivan and Hassan (2012) found that higher percentage of independent directors increases the operational risk and market risk of the firms. This contrasts with the findings from Fama (1980), Fama and Jensen (1983), Pathan (2009) and Htay and Rashid (2011). Increase in operational risk could happen when the banks are dependent to higher percentage of independent directors. This may due to the independent directors failed to oversight the internal

operation as compared to the internal or executive directors who have more control over the processes and operations of the banks. As pointed out by Sullivan and Hassan (2012), higher percentage of independent directors in the banks that failed to oversight the operation of the banks may wrongly fight for the bank's employee salaries and benefits with the perception to retain better human capital (Sullivan & Hassan, 2012).

On the other hand, Dionne and Triki (2005) found that the Sarbanes-Oxley Act enacted in 2002 in the U.S. which required a majority of the board to consist of unrelated directors has no effect on the corporate risk management activity based on a sample of 36 U.S. gold mining firms from 1993 to 1999. Their finding is aligned with Rachdi and Ameer (2011) who studied the relationship between board characteristics with risk-taking on 11 Tunisian commercial banks from 1997 to 2006. They also found that the presence of independent directors within the board has no significant impact on risk-taking.

The study of ownership structure can be categorised into two categories, i.e. the ownership concentration and the type of ownership. Ownership concentration refers to the percentage of ownership by the largest shareholders whereas the type of ownership are individual, institution, state, foreign or managerial ownership (Zulkafli et al., 2005). Large shareholders or high concentration ownership are also referred to as block shareholders (Zulkafli et al., 2005).

Marco and Fernandez (2003) found that ownership concentration increase the bank risk-taking behaviour of the commercial banks in Spain from 1993 to 2000. Leaven and Levine (2007) also found that large owners with substantial cash-flow rights have a tendency to take on more risk based on a sample of 288 banks across 48 countries from 1996 to 2001. As highlighted by Paligorova (2010), there is a positive relationship between equity ownership and corporate risk-taking where owners have a portfolio of share in more than one company, based on a sample of 13,486 firms in 38 countries from 2003 to 2006. Htay and Rashid (2011) also found that high directors' ownership concentration would lead to lower risk management information disclosure based on a sample of 12 listed banks in Malaysia.

On the contrary, Anderson and Fraser (2000) found that managers with substantial ownership took on less risk in response to the regulatory changes which were designed to reduce incentives for risk-taking based on a sample of 150 banks from 1992 to 1994 in the U.S. Lee (2008) also found a negative relationship between ownership and bank risk-taking activities from 1999 to 2006 in Korean banks. However, there was a positive relationship between insider

ownership and capital to equity ratio. This indicates that banks take on less risk and change their financial structures toward safer and more conservative financial structures when their ownership concentration increases. This is supported by Riewsthirathorn, Jumroenvong and Jiraporn (2011) who analysed the impact of ownership concentration on risk-taking behaviour of banks based on a sample of 36 banks in East Asia (namely Thailand, Hong Kong, Singapore, Indonesia and Malaysia) from 2004 to 2008. They found that higher ownership concentration reduced the risk-taking behaviour of banks. This could be due to as ownership concentration gets more significant, the controlling shareholders are more able to exploit minority shareholders and the owners may impose more stringent monitoring on managers, thereby limiting the managers' incentives to take excessive risks.

In a similar vein, Magalhaes, Gutierrez and Tribo (2010) found that bank risk-taking varies at different level of ownership concentration. They found a non-linear relationship between ownership concentration and risk taking in banks of 818 banks around 490 countries worldwide for the period 2000 to 2005. At low level of ownership concentration, the banks' risk increases through less effective monitoring by owners. As the level of ownership concentration increases to moderate level, the banks would take on less risk taking activities due to stringent monitoring by the owners. However, at high level of ownership concentration, banks would increase their risk taking activities when the shareholders act on their own interests on the expenses of minority shareholders which is known as expropriation-of-minority shareholders hypothesis. This is in contrast with Anderson and Fraser (2000), Lee (2008) and Riewsthirathorn et al. (2011).

Due to the inconclusive findings on the impact of board structure and ownership concentration on bank risk-taking behaviour, we would like to find out the impact of ownership concentration on bank risk-taking behaviour in Malaysia after the 1997 Asian Financial Crisis. As suggested by Htay and Rashid (2011), the board can influence better disclosure of risk management information and hence serves as the basic guideline for firm's performance and sustainability of the firms in the particular industry.

METHODOLOGY

This study employs balanced-panel data analysis based on Generalized Least Square estimation to examine the effects of board structure and ownership concentration of the commercial banks in Malaysia on bank risk-taking behaviour from 2001 to 2012. We employ the market risk components; total risk (*TR*), idiosyncratic risk (*IDIOR*), and systematic risk (*SYSR*) estimated using two-market

model. This model had been widely used in the analysis of risk-taking behaviour of commercial banks. Among others that had used this method in estimating the risk factors of commercial banks include Anderson and Fraser (2000), Chen, Steiner and Whyte (2006), and Pathan (2009). Total risk is the standard deviation of a listed company's daily stock returns (R_{it}) for each financial year-end. Total risk measures the dispersion of the stock returns from the expected stock returns. Besides, it represents the risks inherent in a company's assets, liabilities and off-balance sheet positions. The daily stock return is calculated as $R_{it} = \ln(P_{it}/P_{it-1})$, where P_{it} is the stock price which is adjusted for any capital adjustments.

We next estimate the systematic risk and idiosyncratic risk (or unsystematic risks) by applying the two-index market model as previously done by Anderson and Fraser (2000), Chen et al. (2006) and Pathan (2009). The two-index market model is estimated using Equation (1) below:

$$Return_{it} = \alpha_i + \beta_{1i} R_{mt} + \beta_{2i} INTEREST_t + \varepsilon_{it} \quad (1)$$

where $Return_{it}$ is the bank's stock returns of bank i at time t ; R_{mt} is the return of KLCI market index at time t ; $INTEREST$ is the yield on a Malaysian government three-month treasury bill at time t ; α is the intercept term; β_{1i} is the systematic risk of bank i and ε_{it} is the error term of bank i at time t . The unsystematic risk is defined as the standard deviation of the residual obtained from the estimation of the two-market model.

We employ Equation (2) to estimate the impact of board structure and ownership concentration on bank risk-taking behaviour of the commercial banks in Malaysia.

$$\begin{aligned} Risk_{it} = & \alpha_i + \beta_1 (OWCON)_{i,t} + \beta_2 \ln(BS)_{i,t} + \beta_3 (INDIR)_{i,t} \\ & + \beta_4 (BankSize)_{i,t} + \beta_5 (CV)_{i,t} + \beta_6 (CAPITAL)_{i,t} \\ & + \beta_7 (FREQ)_{i,t} + \varepsilon_{it} \end{aligned} \quad (2)$$

Where

- $Risk_{it}$ = Total risk/ systematic risk/ idiosyncratic risk of bank i at time t .
- $OWCON_{it}$ = Percentage of shares held by the top five shareholders of bank i at time t .
- BS_{it} = Natural logarithm of number of directors of bank i at time t .
- $INDIR_{it}$ = Percentage of the number of independent directors over the total number of independent directors of bank i at time t .
- $BankSize_{it}$ = Natural logarithm of total assets of a bank at the end of each financial year of bank i at time t .
- CV_{it} = charter value of bank i at time t .

$CAPITAL_{it}$ = Bank's total equity as a percentage of its total assets of bank i at time t .

$FREQ_{it}$ = The average daily trading volume of shares in a year divided the number of total outstanding shares at the beginning of each year of bank i at time t .

We reestimate Equation (2) the possibility of non-linearity in the ownership concentration which may affect the risk-taking behaviour by including square of ownership concentration as stated by Equation (3).

$$\begin{aligned} Risk_{it} = & \alpha_i + \beta_1 (OWCON)_{i,t} + \beta_2 (OWCON^2)_{i,t} + \beta_3 \ln(BS)_{i,t} \\ & + \beta_4 (INDIR)_{i,t} + \beta_5 (BankSize)_{i,t} + \beta_6 (CV)_{i,t} + \\ & \beta_7 (CAPITAL)_{i,t} + \beta_8 (FREQ)_{i,t} + \varepsilon_{it} \end{aligned} \quad (3)$$

We expect that the square of ownership concentration to have negative effect on bank risk-taking behaviour because the large shareholders may be more risk adverse in order to reduce their losses and to safeguard the value of their shares (Shleifer & Vishny, 1986).

Data and Sample Selection

The sample of this study consists of eight listed banking institutions, i.e. Malayan Banking Berhad, CIMB Bank Berhad, Public Bank Berhad, Hong Leong Bank Berhad, RHB Bank Berhad, AmBank (M) Berhad, Affin Bank Berhad and Alliance Bank Malaysia Berhad. In order to analyse the risk-taking behaviour based on market model, the study took the public listed entities of the commercial banks as a representative of the banking institution. The listed entities of the commercial banks mentioned above are Malayan Banking Berhad, CIMB Bank Berhad, Public Bank Berhad, Hong Leong Bank Berhad, RHB Capital Berhad, AMMB Holdings Berhad, Affin Holdings Berhad and Alliance Financial Group Berhad.

The period of study is from 2001 to 2012. The data source that is extracted from Bloomberg include daily stock prices, volume of stocks traded, total stocks outstanding, total equity of the banks, total assets of the banks and ownership concentration of the banks. The data of board size and the number of independent directors of the banks are extracted from various issues of banks' annual reports.

Definition of Variables

We use board size and the percentage of independent directors to represent the board structure of the commercial banks in Malaysia. Board size refers to the number of directors on the board. This is done by taking the natural logarithm of the total number of directors on the board of each commercial banks from year 2001 to 2012. We expect that large board size would reduce bank risk taking activities in Malaysia. This is because in the presence of opacity in bank lending activities, large bank board size can impose more effective governance in banks. Large bank board size could also provide diversity in terms of knowledge, experience and expertise in various fields that could help to minimise the bank's risk.

Next, we use the percentage of independent directors to investigate the impact of independent directors towards risk-taking behaviour in Malaysian commercial banks. We expect that more independent boards will reduce bank risk taking activities in Malaysia. This is because independent directors rely on their reputation as effective monitors in order to maintain their existing positions and obtain new positions in other organisations. Therefore, independent directors tend to be more risk adverse and impose more effective governance in banks.

Ownership concentration is also referred to as large block holders (Demsetz, Saidenberg, & Strahan, 1997). This study defines ownership concentration as the total ownership percentage of shares held by the top five shareholders in a listed company, which is similar to a study conducted by Haniffa and Hudaib (2006) and Riewstathirathorn et al. (2011). We expect higher ownership concentration is related to higher risk takings in Malaysian banks. This is because shareholders with large ownership concentration may find it mutually advantageous to cooperate with management to take on higher risk taking activities, and this may lead to poor corporate performance due to less effective monitoring. Nevertheless, the relationship may be non-linear because large shareholders who hold substantial amount of shares in the firm may be more risk adverse in order to safeguard the value of their shares and to reduce any losses (Shleifer & Vishny, 1986).

We employ bank size (*BankSize*), charter value (*CV*), financial leverage (*CAPITAL*) and frequency of trading (*FREQ*) suggested by Saunders, Strock and Travlos (1990), Demsetz et al. (1997), Anderson and Fraser (2000) and Pathan (2009) as control variables in our study. Demsetz and Strahan (1997) found that the frequency of trading is a substitution for the speed of new information reflected in stock price and therefore, this variable should be correlated with the variances in a bank's on-balance sheet and off-balance sheet portfolios.

Descriptive Statistics

The descriptive statistics are presented in Table 1. Based on Table 1, the mean total risk of 1.66% is lower than the reported 2.13% by Anderson and Fraser (2000) based on the U.S. market from 1992 to 1994 and Pathan (2009) based on the U.S. market with average mean of 2.26% from 1997 to 2004. The mean systematic risk of 0.49% is lower than the reported 0.52% by Pathan (2009) based on the U.S. market from 1997 to 2004. The mean idiosyncratic risk of 16.68% is higher than the reported 2.08% by Anderson and Fraser (2000) and 1.98% by Pathan (2009).

Based on Table 1, the mean board size is 9.854 (or 10 persons) with a minimum of 6 persons and a maximum of 14 persons. This is lower than the reported mean board size of large U.S. bank holding companies by Pathan (2009) of 12.92 (or 13 persons). The mean of the independent directors in this study is 4.875 (or 5 persons) with a minimum of 2 persons and a maximum of 9 persons.

The mean of the independent directors to total board size ratio in this study is 50.27% which is in line with the Malaysian Code of Corporate Governance 2012. The Malaysian Code of Corporate Governance 2012 states that the board must comprise a majority of independent directors. The Bank Negara Malaysia's "Guidelines on Corporate Governance for Licensed Institutions" states that banks are required to have at least one-third of their board members are independent directors. The mean independent directors to total board size ratio of 50.27% however is lower than the reported percentage of independent directors of large U.S. bank holding companies of 64.52% by Pathan (2009).

The mean ownership concentration in this study is 57.10%. This means that the top five shareholders on average own 57.10% shareholdings of the banks and this is considered to be highly concentrated. This ownership concentration is only slightly lower than the reported mean percentage of shares held by the top 5 shareholders of banks in East Asia (which include Thailand, Hong Kong, Singapore, Indonesia and Malaysia) of 57.87% by Riewsthirathorn et al. (2011). This is because the stock exchanges in the South East Asia such as Bursa Malaysia, is dominated by companies with substantial shareholders, who are typically government owned or promoted institutions or by families who usually appoint independent directors for political reasons, for contracts and contacts, and due to their personal relationship with the CEO and other non-independent directors (Haniffa & Hudaib, 2006).

Table 1
Descriptive statistics

Variable	Anderson & Fraser (2000)	Pathan (2009)	Mean	Std. Dev.	Min	Max
Total risk	2.13%	2.2%	1.66%	0.66%	0.45%	3.83%
Systematic risk	0.04%	0.52%	0.49%	0.34%	-0.12%	2.16%
Idiosyncratic risk	2.08%	1.98%	16.68%	15.31%	0.64%	116.09%
Board size			9.854	1.542	6.000	14.000
Independent directors board size			4.875	1.308	2.000	9.000
Independent directors ratio to total board size (%)			50.27%	13.59%	16.67%	80.00%
Ownership concentration (%)			57.10%	19.39%	15.16%	86.72%
Bank size (in million)			115,248	95,009	17,220	494,866
Charter value			1.050	0.056	0.942	1.156
Bank capital (%)			8.32%	1.78%	5.13%	14.41%
Frequency of trading			0.12%	0.07%	0.02%	0.36%

This table presents the results of the descriptive statistics. Total risk is the standard deviation of the bank's daily stock returns over a year. Systematic risk is the coefficient of R_{mt} , i.e. β_1 in the two-index market model as represented by Equation (1). *IDIOR* is calculated as the standard deviation of ε_{it} in Equation (1). Ownership concentration is the percentage of shares held by the top five shareholders of the bank. Board size is the number of directors on the board. Independent Directors is the percentage of the independent directors as a percentage of board size. Bank size is the total assets of a bank at the end of financial year. Charter value is the charter value of the bank calculated (following Keeley, 1990) as the book value of total assets plus market value of equity minus book value of equity, all divided by the book value of total assets. Bank capital is the bank total equity as a percentage of its total assets. Frequency of trading is the average daily trading volume of shares in a year divided the number of total outstanding shares.

The mean bank size is RM115.25 billion (or equivalent to USD32.63 billion based on exchange rate of 3.5321, i.e. the average yearly exchange rate from 2001 to 2012). This bank size is higher than the mean bank size of USD23.66 billion of the large U.S. bank holding companies as reported by Pathan (2009). The mean bank size is also higher than the reported mean bank size of USD16.26 billion in East Asia banks as reported by Riewisathirathorn et al. (2011).

The mean charter value in this study at 1.05 is lower than the reported mean charter value of 1.10 by Pathan (2009). The mean bank capital at 8.32% is lower than the reported mean bank capital of 9.26% by Pathan (2009) and it is also lower than the reported mean bank capital of 9.00% by Riewsthirathorn et al. (2011). The mean frequency of trading at 0.12% is lower than the reported mean frequency of trading of 0.32% by Pathan (2009).

Correlation Analysis

The correlation coefficients between board size, independent directors, ownership concentration and bank risk measures are largely consistent with the expectation. The correlation coefficients between *CV* and *TR* of 0.592 and between *CV* and *LNTA* of 0.578 are only marginally above average. The correlation matrix suggests the study does not suffer from serious multicollinearity problem among the regressors (Gujarati, 2004).

Table 2 presents the Pearson’s pair-wise correlation matrix between variables.

Table 2
Correlation matrix

Variables	TR	SYST	IDIOR	LNBS	INDIR	OWNCON	LNTA	CV	CAPITAL	FREQ
TR	1.000									
SYSR	-0.221	1.000								
IDIOR	-0.075	0.431	1.000							
LNBS	0.003	0.137	0.010	1.000						
INDIR	-0.151	0.014	-0.035	-0.375	1.000					
OWNCON	0.182	-0.015	0.000	0.144	-0.439	1.000				
LNTA	-0.475	0.475	0.105	0.206	0.297	-0.116	1.000			
CV	-0.592	0.447	0.193	0.116	0.198	-0.388	0.578	1.000		
CAPITAL	-0.064	-0.166	-0.254	-0.046	0.150	-0.040	-0.163	-0.181	1.000	
FREQ	0.267	-0.085	-0.040	0.001	0.130	-0.295	-0.074	-0.009	0.010	1.000

This table presents the Pearson pair-wise correlation matrix of total risk (*TR*), systematic risk (*SYSR*), idiosyncratic risk (*IDIOR*), board size (*LNBS*), independent directors (*INDIR*), ownership concentration (*OWNCON*), bank size (*LNTA*), charter value (*CV*), bank capital (*CAPITAL*) and frequency of trading (*FREQ*).

RESULTS AND DISCUSSION

The estimated results of the board size, percentage of independent directors and ownership concentration on bank risk-taking behaviour are presented in Table 3.

Table 3 presents the estimated results for total risk based on GLS estimation. Based on the Hausman test, BP LM test and redundant F-test, the fixed effect model is deemed to be appropriate for Model (1) and (3) whereas we used Pooled OLS for Model (2).

Results found that board size is positively related to total risk and credit risk and it is statistically significant at 1% and 5% significance level, respectively. This means that larger board size increase the total risk of the commercial banks in Malaysia. The result is consistent with the findings by Lipton and Lorsch (1992) and Jensen (1993) that larger board size result in less effective board of directors as there would be free-rider problems (due to agency problem) as well as the difficulty of getting timely decisions. The board size on average in Malaysia is 10 members. Board sizes, which are above seven or eight members, are considered to be ineffective as any additional benefits from increased monitoring gained by additional membership will outweigh the cost related with slow decision making, the effort problem and easier control by the CEO (Jensen, 1993). A CEO who is risk inclined may take the opportunity to influence the board to take on higher risk. This may contribute to ineffective management of the board of directors and hence excessive risk-taking.

In addition, Haniffa and Hudaib (2006) found that larger board size affects firm's performance of 347 companies listed on the Kuala Lumpur Stock Exchange. They attributed this to the higher compensation cost of the board and higher incentives to reduce their duties as the size of the board gets bigger. Tarraf and Majeske (2010) also found the bank holding companies with higher risk-taking levels have lower financial performance from 2006 to 2009 based on a sample of 74 U.S. bank holding companies. Similar results are also suggested by Rashid, Zoysa, Lodh and Rudkin (2010) in Bangladesh from 2005 to 2009. According to Rashid et al. (2010), higher number of board of directors could lead to information asymmetries between the independent directors and other directors, which would lead to lower firm performance. The result supports that higher board size would have a significant relationship with bank risk taking in Malaysia.

Table 3
Estimated results for bank risk-taking behaviour

Variable	Model 1(a)	Model 1(b)	Model 2(a)	Model 2(b)	Model 3(a)	Model 3(b)
Board size	0.010*** (0.004)	0.010*** (0.004)	-0.001 (0.002)	-0.001 (0.003)	0.147 (0.108)	0.130 (0.112)
Independent directors	0.005 (0.005)	0.005 (0.004)	-0.003 (0.003)	-0.003 (0.004)	0.181 (0.146)	0.166* (0.083)
Ownership concentration	0.039*** (0.009)	0.055** (0.018)	0.002 (0.002)	-0.004 (0.006)	0.434 (0.276)	-0.944 (0.829)
Ownership concentration ²	-	-0.012 (0.012)	-	0.006 (0.006)	-	1.041 (0.671)
Bank size	0.010*** (0.001)	0.010*** (0.001)	0.001*** (0.001)	0.001** (0.001)	0.065 (0.044)	0.073 (0.061)
Charter value	-0.046*** (0.014)	-0.045** (0.014)	-0.019** (0.007)	-0.018** (0.006)	0.309 (0.434)	0.230 (0.474)
Bank capital	-0.114*** (0.028)	-0.111*** (0.014)	-0.007 (0.180)	-0.009 (0.018)	-1.054 (0.850)	-1.289 (1.038)
Frequency of trading	4.240*** (0.979)	4.360*** (0.460)	-0.076 (0.477)	0.126 (0.248)	52.298* (30.095)	42.043* (19.270)
Constant	0.129*** (0.017)	0.124*** (0.022)	-0.029*** (0.008)	-0.028** (0.010)	-1.547*** (0.523)	-1.067**
Overall R ²	0.332	0.324	0.299	0.302	0.013	0.088
F-test	16.09***	13.97***	5.36***	4.71***	3.10***	2.93***
F-test (POLS vs. FEM)	7.07***	7.00***	0.64	0.58	6.99**	4.09***
BP LM test	0.00	0.02	4.05	1.52	40.65***	4.30**
Hausman test	48.18***	34.73***	1.52	3.81	16.86***	27.17***

Notes: Model (1) estimates the relationship between board structure and ownership concentration on total risk, Model (2) estimates the relationship between board structure and ownership concentration on systematic risk and Model (3) estimates the relationship between board structure and ownership concentration on idiosyncratic risk. Model (a) estimates the direct effect of ownership concentration while Model (b) provides the estimation of non-linear relationship between ownership concentration and risk-taking of the banks. *, ** and *** indicates significance level at 10%, 5% and 1% respectively. Robust standard error is reported in parenthesis. (Refer to Appendix A, B and C for details estimation)

The results showed that ownership concentration is positively related to total risk and credit risk of the commercial banks at 1% and 5% significance level, respectively. This indicates that more concentrated ownership increase the total risk of the banks. This means that an increase in ownership concentration encourage risk-taking activities of banks. According to McConnell and Servaes (1990), as ownership increases beyond a certain point, the shareholders with high shareholdings will allocate firm resources for their own interest regardless of its

impact to other shareholders. The result is consistent with Marco and Fernandez (2003) studies in Spain from year 1993 to 2000. Similarly, Haniffa and Hudaib (2006) also found that concentrated shareholdings lead to ineffective monitoring due to conflict of interest based on a sample of 347 non-financial and non-unit trust main board listed companies in Malaysia from 1996 to 2000.

The study by Leaven and Levine (2007) also suggests that large owners with substantial cash-flow rights in highly regulated banking industry have a tendency to increase risk taking because of the perception that the bank will be bailout during financial crisis by the regulator. Nevertheless, this relationship is subject to management structure, bank regulations and investor protection laws. Magalhaes et al. (2010) study found that high level of ownership concentration would result in higher bank risk based on a sample of 818 banks around 490 countries from year 2000 to 2005. Based on their argument, high level of ownership concentration, banks would increase their risk-taking activities when the shareholders act on their own interests on the expenses of minority shareholders which is known as expropriation-of-minority shareholders hypothesis.

Paligorova (2010) also found a positive relationship between equity ownership and corporate risk-taking behaviour where owners have a portfolio of shares in more than one company, based on a sample of 13,486 firms in 38 countries from year 2003 to 2006. The finding is consistent with McConnell and Servaes (1990), Marco and Fernandez (2003), Haniffa and Hudaib (2006), Leaven and Levine (2007), and Magalhaes et al. (2010). In summary, the result support the above hypothesis that high ownership concentration have a significant relationship on bank risk-taking in Malaysia.

On the other hand, we found no significant relationship between bank risk-taking with the independent directors of the banks in Malaysia. The result is consistent with the study by Bhagat and Bernard (1999) that found no empirical support that higher board independence correlates with higher firm performance based on a sample of 205 large U.S. public companies from 1988 to 1991. In a similar vein, Dionne and Triki (2005) also found a majority of the board to consist of unrelated directors has no effect on the corporate risk management activity based on a sample of 36 U.S. gold mining firms from 1993 to 1999.

In Malaysia, Haniffa and Hudaib (2006) found that boards which consists a majority of independent directors do not affect firm performance. This could be due to Malaysia is a developing country where independent directors are selected more often for political reasons, for contacts and contracts, and not due to their expertise and experience (Haniffa & Hudaib, 2006). In addition, they discussed that the selection of independent directors which were not based on expertise

and experience would result in directors who are not able to perform their roles effectively and may be unable to perform independent monitoring role.

This is supported by Rashid et al. (2010) who found that independent directors do not add value to firm economic performance based on a sample of 274 non-financial firms in Bangladesh from 2005 to 2009. It is also possible that independent directors have personal relationships with the CEO and other non-independent directors prior to their appointment as independent directors (Rashid et al., 2010). Similar results were found by Rachdi and Ameur (2011) based on a sample of 11 large Tunisian commercial banks from 1997 to 2006. The finding that independent directors do not affect firm performance was consistent with Bhagat and Bernard (1999), Hermalin and Weisbach (2003), Dionne and Triki (2005), Haniffa and Hudaib (2006), and Rashid et al. (2010).

Our results suggest that bank size is positively related to the bank risk-taking behaviour of the commercial banks in Malaysia and it is statistically significant at 1% significance level for both total risk, systematic risk and credit risk. As pointed out by Barth, Lin, Ma, Seade and Song (2013), larger banks are better off in terms of risk management and hence can assume higher risky asset in their portfolio with more lending activities which increased the overall risk of the banks. Besides, Mishkin (1999) pointed out that larger banks were more likely to be bailed out by the government and this led to moral hazard in the large banks and this might also be reflected in the overall risk profile of the banks.

We found that charter value and bank capital are negatively related to the bank's total risk and systematic risk. This result is consistent with Pathan (2009) and Rachdi and Ameur (2011). Kochubey and Kowalczyk (2014) found an inverse relationship between banks' capital level and risk-taking based on a panel dataset of U.S. commercial banks from 2001 to 2009. In a similar vein, Deelchand and Padgett (2009) found a negative relationship between bank capital and bank risk-taking based on a sample of 263 Japanese cooperative banks from 2003 to 2006. Moussa (2015) also found a negative relationship between bank capital and bank risk-taking based on a sample of 18 banks in Tunisia from 2000 to 2010. Furlong and Kwan (2005) found a strong negative relationship between bank charter value and bank risk-taking in particular during the earlier periods of 1986 to 2003 as the average charter value of the banks were relatively low.

Frequency of trading is found to be positively related to total risk and also the idiosyncratic risk of the banks which suggest that more transactions of the banking stock increase the risk of the banks. This indicates that the greater the speed at which new information is reflected in the stock price, the higher the bank risk. The result is supported by Anderson and Fraser (2000) and Pathan (2009).

Negative relationship is found between bank capital and total risk. This indicates that highly capitalised banks have lower bank risk. This could be due to banks with higher capital would be in a better position to withstand any unforeseen circumstances, have better liquidity and are able to quickly draw on their capital should the need arise.

CONCLUSION

This study examines the relationship between ownership concentration, board size and independent directors and risk-taking behaviours in Malaysian banks. Ownership concentration is measured as the total ownership percentage of share held by the top five shareholders in a bank. Board size refers to the number of directors on the board. Independent directors are measured by the percentage of independent directors to the total number of directors on the board.

The total risk (*TR*), systematic risk (*SYSR*) and idiosyncratic risk (*IDIOR*) are estimated using the market model. The impact of the ownership concentration, board size and independent directors on the bank risk is then estimated based on GLS estimation. The sample of this study consists of eight listed banks in Malaysia, namely, Malayan Banking Berhad, CIMB Bank Berhad, Public Bank Berhad, Hong Leong Bank Berhad, RHB Bank Berhad, AmBank (M) Berhad, Affin Bank Berhad and Alliance Bank Berhad. The period of study is from 2001 to 2012.

The study found that ownership concentration has a significant positive relationship with the total risk of the banks. This result was consistent with McConnell and Servaes (1990), Marco and Fernandez (2003), Haniffa and Hudaib (2006), Leaven and Levine (2007), Magalhaes et al. (2010) and Paligorova (2010). The study also suggest non-linear relationship of ownership concentration with bank credit risk as suggested by Shleifer and Vishny (1986).

The study suggests that board size has a significant positive relationship with total risk taking of the banks. The result is consistent with Lipton and Lorsch (1992), Jensen (1993), Yermack (1996), Eisenberg, Sundgren and Wells (1998), Haniffa and Hudaib (2006), Rashid et al. (2010), and Tarraf and Majeske (2010).

Contary to expectation, there is no significant impact of the presence independent directors to the risk taking behaviour of banks. The result is supported by Bhagat and Bernard (1999), Hermalin and Weisbach (2003), Dionne and Triki (2005), Haniffa and Hudaib (2006), Rashid et al. (2010), and Rachdi and Ameur (2011). The Malaysian Code of Corporate Governance 2012 recommend that the

board must comprise of a majority of independent directors. This may not be effective if the independent directors are appointed based on political reasons, for contracts and due to their personal relationship with the CEO and other executive directors especially in developing countries such as Malaysia. Therefore, the contributions of independent directors may not be significant and effective in monitoring and advising the company accordingly.

As concluding remark, the findings in this study implied that bank board size and ownership concentration are important determinants of bank risk-taking behaviour while the percentage of independent directors is statistically insignificant. Given that the board structure is an important element of bank risk-taking, regulators should continue to enhance the monitoring of banks (where bank size is large and ownership concentration is high) to control the banks' potential for excessive risk taking.

This study covered the general perspective of the role of board of directors and ownership concentration on bank risk-taking in Malaysia. We suggest that future research could extensively look at various aspects of corporate governance which include characteristics of board remuneration; independent directors tenure; board professionalism or qualifications; and risk management information disclosure. Future studies could also analyse bank risk-taking from the risk adjusted return of bank perspective.

ACKNOWLEDGEMENTS

This paper is part of the research supported by UMRG research grant (RP001B-13SBS), University of Malaya.

REFERENCES

- Anderson, R. C., & Fraser, D. R. (2000). Corporate control, bank risk taking, and the health of the banking industry. *Journal of Banking and Finance*, 24(8), 1383–1398. [https://doi.org/10.1016/S0378-4266\(99\)00088-6](https://doi.org/10.1016/S0378-4266(99)00088-6)
- Bank Negara Malaysia. (2001). Bank Negara Malaysia annual report 2000. Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=4&lang=en
- Bank Negara Malaysia. (2013). Guidelines on corporate governance for licensed institutions. Retrieved 25 January 2015, from http://www.bnm.gov.my/guidelines/01_banking/04_prudential_stds/16_corporate_governance.pdf

- Barth, J. R., Lin, C., Ma, Y., Seade, J., & Song, F. M. (2013). Do bank regulation, supervision and monitoring enhance or impede bank efficiency? *Journal of Banking and Finance*, 37, 2879–2892. <https://doi.org/10.1016/j.jbankfin.2013.04.030>
- Bhagat, S., & Bernard, B. (1999). The uncertain relationship between board composition and firm performance. *Business Lawyer*, 54(3), 921–963.
- Chen, C. R., Steiner, T. L., & Whyte, A. M. (2006). Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry. *Journal of Banking & Finance*, 30(3), 915–945. <https://doi.org/10.1016/j.jbankfin.2005.06.004>
- Cheung, Y. L. & Chan, Y. (2004). Corporate governance in Asia. *Asia Pacific Development Journal*, 11(2), 1–31.
- Dadush, U., Lynn, R., Riordan, M., Dasgupta, D., & Johannes, R. (1998). What effect will East Asia's crisis have on developing countries? *PREM Notes No. 1*. Washington, DC: World Bank. Retrieved 30 April 2014, from <https://openknowledge.worldbank.org/handle/10986/11558>
- Deelchand, T. & Padgett, C. (2009). The relationship between risk, capital and efficiency: Evidence from Japanese Cooperative Banks. *ICMA Centre Discussion Papers in Finance DP2009-12*. <https://doi.org/10.2139/ssrn.1525423>
- Demsetz, R. S., & Strahan, P. E. (1997). Diversification, size, and risk at bank holding companies. *Journal of Money, Credit and Banking*, 29, 300–313. <https://doi.org/10.2307/2953695>
- Demsetz, R. S., Saidenberg, M. R., & Strahan, P. E. (1997). Agency problem and risk taking at banks. *Working paper no. 19*, Federal Reserve Bank of New York.
- Dionne, G., & Triki, T. (2005). Risk management and corporate governance: The importance of independence and financial knowledge for the board and the audit committee, *HEC Montreal Working Paper No. 05-03*. Available at SSRN: <https://ssrn.com/abstract=730743> or <https://doi.org/10.2139/ssrn.730743>
- Eisenberg, T., Sundgren, S., & Wells, M. T. (1998). Larger board size and decreasing firm value in small firms. *Journal of Financial Economics*, 48(1), 35–54. [https://doi.org/10.1016/S0304-405X\(98\)00003-8](https://doi.org/10.1016/S0304-405X(98)00003-8)
- Fama, E. (1980). Agency problems and the theory of the firm. *Journal of Political Economy*, 88(2), 288–307. <https://doi.org/10.1086/260866>
- Fama, E., & Jensen, M. (1983). Separation of ownership and control. *Journal of Law and Economics*, 26, 301–325. <https://doi.org/10.1086/467037>
- Furlong, F., & Kwan, S. (2005). *Market-to-book, charter value and bank risk-taking: A recent perspective*. San Francisco: Research Department, Federal Reserve Bank of San Francisco. Retrieved from <https://www.bis.org/bcbsevents/rtf05Kwan.pdf>
- Gujarati, D. (2004). *Basics econometrics* (4th ed.). New York: The McGraw-Hill Companies.
- Haniffa, R., & Hudaib, M. (2006). Corporate governance structure and performance of Malaysian listed companies. *Journal of Business Finance & Accounting*, 33(7–8), 1034–1062. <https://doi.org/10.1111/j.1468-5957.2006.00594.x>

- Hermalin, B. E., & Weisbach, M. S. (2003). Boards of directors as an endogeneously determined institution: A survey of the economic literature. *Economic Policy Review*, 9(1), 7–26.
- Htay, S. N., & Rashid, H. M. (2011). Corporate governance and risk management information disclosure in Malaysian listed banks: Panel data analysis. *International Review of Business Research Papers*, 7, 159–176.
- Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, 48(3), 831–880. <https://doi.org/10.1111/j.1540-6261.1993.tb04022.x>
- Keeley, M. (1990). Deposit insurance, risk and market power in banking. *The American Economic Review*, 80(5), 1183–1200.
- Khan, H. (1999). Corporate governance of family business in Asia: What's right and what's wrong? *The World Bank Working Paper No. 13*, World Bank.
- Kochubey, T., & Kowalczyk, D. (2014). *The relationship between capital, liquidity and risk in commercial banks*. Praha: Praha Centre for Economic Research and Graduate Education.
- Krugman, P. (1998, 7 September). *Saving Asia: It's time to get radical the IMF plan not only has failed to revivify Asia's troubled economies but has worsened the situation. It's now time for some painful medicine*. Retrieved 15 May 2014, from http://www.money.cnn.com/magazines/fortune/fortune_archive/1998/09/07/247884/
- Leaven, L., & Levine, R. (2007). *Corporate governance, regulation, and bank risk taking*. Rhode Island: Brown University.
- Lee, S. W. (2008). Ownership structure, regulation, and bank risk-taking: Evidence from Korean banking industry. *Journal of Investment Management and Financial Innovations*, 5(4), 70–74.
- Lipton, M., & Lorsch, J. W. (1992). A modest proposal for improved corporate governance. *Business Lawyer*, 48(1), 59–77.
- Magalhaes, R., Gutiérrez U. M., & Tribo, J. A. (2010). *Banks' ownership structure, risk and performance*. Available at SSRN: <https://ssrn.com/abstract=1102390>. <https://doi.org/10.2139/ssrn.1102390>
- Marco, T. G., & Fernandez, M. D. (2003). *Risk-taking behaviour and ownership in the banking industry: The Spanish evidence*. Pamplona: Public University of Navarre.
- McConnell, J. J., & Servaes, H. (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics*, 27(2), 595–612. [https://doi.org/10.1016/0304-405X\(90\)90069-C](https://doi.org/10.1016/0304-405X(90)90069-C)
- Mishkin, F. S. (1999). Financial consolidation: Dangers and opportunities. *Journal of Finance and Banking*, 23(2–4), 675–691. [https://doi.org/10.1016/S0378-4266\(98\)00084-3](https://doi.org/10.1016/S0378-4266(98)00084-3)
- Moussa, M. A. (2015). The relationship between capital and bank risk: Evidence from Tunisia. *International Journal of Economics and Finance*, 7(4), 223–232. <https://doi.org/10.5539/ijef.v7n4p223>
- Paligorova, T. (2010). *Corporate risk taking and ownership structure*. Ontario: Bank of Canada.

- Pathan, S. (2009). Strong boards, CEO power and bank risk-taking. *Journal of Banking & Finance*, 33(7), 1340–1350. <https://doi.org/10.1016/j.jbankfin.2009.02.001>
- Rachdi, H., & Ameer, I. G. (2011). Board characteristics, performance and risk taking behaviour in Tunisian banks. *International Journal of Business and Management*, 6(6), 88–97. <https://doi.org/10.5539/ijbm.v6n6p88>
- Rashid, A., Zoysa, A. D., Lodh, S., & Rudkin, K. (2010). Board composition and firm performance: Evidence from Bangladesh. *Australasian Accounting Business and Finance Journal*, 4(1), 76–95.
- Riewasathirathorn, P., Jumroenvong, S., & Jiraporn, P. (2011). *The impact of ownership concentration on bank performance and risk-taking: Evidence from East Asia*. Bangkok: Thammasat University Bangkok.
- Saunders, A., Strock, E., & Travlos, N. G. (1990). Ownership structure, deregulation, and bank risk-taking. *The Journal of Finance*, 45(2), 643–654. <https://doi.org/10.1111/j.1540-6261.1990.tb03709.x>
- Securities Commission Malaysia. (2012). *Malaysian code on corporate governance 2012*. Kuala Lumpur: Securities Commission Malaysia.
- Shleifer, A., & Vishny, R. (1986). Large shareholders and corporate control. *Journal of Political Economy*, 94(3), 461–488. <https://doi.org/10.1086/261385>
- Sullivan, J. O., & Hassan, M. K. (2012). *The relationship between board characteristics and risk-taking: Evidence from bank holding companies*. New Orleans: Southern University at New Orleans.
- Takatoshi, I., & Yuko, H. (2007). Bank restructuring in Asia: Crisis management in the aftermath of the Asian financial crisis and prospects for crisis prevention in Malaysia. *The RIETI Discussion Paper Series 07-E-039*, The Research Institute of Economy, Trade and Industry, Japan.
- Tarraf, H., & Majeske, K. (2010). *Impact of risk taking on bank financial performance during 2008 financial crisis*. Oakland: Oakland University.
- Yermack, D. (1996). Higher market valuation of companies with a small board of directors. *Journal of Financial Economics*, 40(2), 185–211. [https://doi.org/10.1016/0304-405X\(95\)00844-5](https://doi.org/10.1016/0304-405X(95)00844-5)
- Zulkafli, A. H., Abdul Samad, M. F., & Ismail, M. I. (2005). *Corporate governance in Malaysia*. Kuala Lumpur: University of Malaya.

APPENDIX A

Regression model for total risk

Variable	Model (a)			Model (b)		
	POLS	Fixed Effect	Random Effect	POLS	Fixed Effect	Random Effect
Board size	0.005 (0.004)	0.010*** (0.004)	0.005 (0.004)	0.006 (0.006)	0.010** (0.004)	0.006 (0.006)
Independent directors	0.004 (0.005)	0.005 (0.005)	0.004 (0.005)	0.004 (0.002)	0.005 (0.004)	0.004* (0.002)
Ownership concentration	0.002 (0.003)	0.039*** (0.009)	0.002 (0.003)	-0.004 (0.017)	0.055** (0.018)	-0.004 (0.017)
Ownership concentration ²	-	-	-	0.006 (0.017)	-0.012 (0.012)	0.006 (0.017)
Bank size	0.002*** (0.001)	0.010*** (0.001)	0.002** (0.001)	0.002** (0.001)	0.010*** (0.001)	0.002*** (0.001)
Charter value	-0.059*** (0.012)	-0.046*** (0.014)	-0.059*** (0.012)	-0.059*** (0.012)	-0.045** (0.014)	-0.059*** (0.012)
Bank capital	-0.075** (0.030)	-0.114*** (0.028)	-0.075** (0.030)	-0.077** (0.031)	-0.111*** (0.014)	-0.077** (0.031)
Frequency of trading	2.409*** (0.792)	4.240*** (0.979)	2.409*** (0.792)	2.605*** (0.393)	4.360*** (0.459)	2.605*** (0.393)
Constant	0.090*** (0.140)	0.129*** (0.017)	0.090*** (0.140)	0.091*** (0.013)	0.124*** (0.022)	0.091*** (0.013)
Overall R ²	0.487	0.332	0.487	0.488	0.324	0.488
F-test	11.92	16.09	83.05***	10.34***	13.97***	82.74***
F-test (POLS vs. FEM)		7.07**			7.00***	
BP LM test		0.00			0.02	
Hausman test		48.18***			34.73***	

Notes: Model (a) estimates the direct effect of ownership concentration and Model (b) estimates the non-linear relationship of ownership concentration.

*, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively. Robust standard error is stated in parenthesis.

APPENDIX B

Regression model for market risk

Variable	Model (a)			Model (b)		
	POLS	Fixed Effect	Random Effect	POLS	Fixed Effect	Random Effect
Board size	-0.001 (0.002)	0.000 (0.003)	-0.001 (0.002)	-0.001 (0.003)	0.000 (0.002)	-0.000 (0.003)
Independent directors	-0.003 (0.003)	0.001 (0.004)	-0.003 (0.003)	-0.003 (0.004)	0.001 (0.003)	-0.003 (0.004)
Ownership concentration	0.002 (0.002)	0.001 (0.007)	0.002 (0.002)	-0.004 (0.006)	0.006 (0.020)	-0.004 (0.006)
Ownership concentration ²	-	-	-	0.006 (0.006)	-0.003 (0.016)	0.006 (0.006)
Bank size	0.001*** (0.001)	0.001 (0.001)	0.001*** (0.001)	0.001** (0.001)	0.001 (0.002)	0.001*** (0.001)
Charter value	-0.019** (0.007)	-0.026** (0.011)	-0.019** (0.007)	-0.018** (0.006)	-0.026** (0.009)	-0.018*** (0.006)
Bank capital	-0.007 (0.180)	-0.007 (0.021)	-0.007 (0.018)	-0.009 (0.018)	-0.007 (0.020)	-0.009 (0.018)
Frequency of trading	-0.076 (0.477)	0.046 (0.728)	-0.076 (0.477)	0.126 (0.248)	0.080 (0.393)	0.126 (0.248)
Constant	-0.029*** (0.008)	-0.029** (0.013)	-0.029*** (0.008)	-0.028** (0.010)	-0.031 (0.022)	-0.028 (0.010)
Overall R ²	0.299	0.260	0.299	0.302	0.260	0.302
F-test	5.36***	1.62	38.90***	4.71***	1.40	37.65***
F-test (POLS vs. FEM)		0.64			0.58	
BP LM test		4.05			1.52	
Hausman test		1.52			3.81	

Notes: Model (a) estimates the direct effect of ownership concentration and Model (b) estimates the non-linear relationship of ownership concentration.

*, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively. Robust standard error is stated in parenthesis.

APPENDIX C

Regression model for idiosyncratic risk

Variable	Model (a)			Model (b)		
	POLS	Fixed Effect	Random Effect	POLS	Fixed Effect	Random Effect
Board size	0.031 (0.115)	0.147 (0.108)	0.031 (0.115)	0.061 (0.171)	0.130 (0.112)	0.061 (0.171)
Independent directors	-0.020 (0.153)	0.181 (0.146)	-0.020 (0.153)	-0.056 (0.140)	0.166* (0.083)	-0.056 (0.140)
Ownership concentration	0.044 (0.103)	0.434 (0.276)	0.044 (0.103)	-1.829** (0.649)	-0.944 (0.829)	-1.829*** (0.649)
Ownership concentration ²				1.824** (0.648)	1.041 (0.671)	1.824*** (0.648)
Bank size	-0.006 (0.027)	0.065 (0.044)	-0.006 (0.027)	-0.002 (0.024)	0.073 (0.061)	-0.002 (0.024)
Charter value	0.544 (0.380)	0.309 (0.434)	0.544 (0.380)	0.420 (0.312)	0.230 (0.474)	0.420 (0.312)
Bank capital	-1.880** (0.916)	-1.054 (0.850)	-1.880** (0.916)	-2.408* (1.206)	-1.289 (1.038)	-2.408** (1.206)
Frequency of trading	-4.333 (24.285)	52.298* (30.095)	-4.333 (24.285)	59.487** (27.020)	42.043* (19.270)	59.487** (27.020)
Constant	-0.125 (0.429)	-1.547*** (0.523)	-0.125 (0.429)	0.153 (0.782)	-1.067** (0.406)	0.153 (0.782)
Overall R ²	0.246	0.013	0.246	0.246	0.088	0.246
F-test	3.65***	3.10***	29.01***	3.56***	2.93***	28.45***
F-test (POLS vs. FEM)		6.99**			4.09***	
BP LM test		40.65***			4.30***	
Hausman test		16.86***			27.17***	

Notes: Model (a) estimates the direct effect of ownership concentration and Model (b) estimates the non-linear relationship of ownership concentration.

*, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively. Robust standard error is stated in parenthesis.