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Panel Data Analysis on the Effect of Establishing the Enterprise Risk Management on Firms' Performances

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This study analyses financial performances of non-financial firms that have established enterprise risk management (ERM). Content analysis is used to collect the data of 74 firms with board-level risk management committee (RMC) and another control firms without board-level RMC. ERM establishment is measured by ERM index and firms' performances are measured by ROE, ROA and Tobin's Q. Data is analysed using the Panel Data Analysis with Stata13. Results show that both groups of firms had no significant relationship with their performances. The findings suggest that having a risk management committee at board-level does not make a firm to perform better than a firm without board-level RMC.

Field of research: Enterprise Risk Management

JEL Codes: M1, M4, C33

1. Introduction

Business firms today are becoming more complex and may face an extensive amount of risk and thus risk management has become a central function of a business process (Acharyya and Mutenga, 2013). According to Lundqvist (2014), the enterprise risk management (ERM) practices are becoming more popular as firms are pressured to manage risks holistically. Further, a business is not making profit if those risks are separately managed and therefore there is an increasing interest in the implementation of ERM (Rasid, Isa and Ismail, 2014). Quon, Zenghal and Maingot (2012) state that many cases of firms' failures are due to poor risk management and corporate governance and thus encourage firms to implement ERM to reduce possibility of failure.

According to Sobel and Reding (2014), the stability and improvement of firm's performances depend highly on the effective roles of corporate governance and risk management. Quon et.al. (2012) add that corporate governance and risk management are mutually related and dependent on each other. Demidenko and McNutt (2010) state that ERM is a key component of corporate governance especially in the agent-principal relationship to achieve firm's objectives and in ensuring the principals' interests are being taken care by the efficient behavior of their agents. Thus, ERM is designed to increase the ability of the board of directors (BOD) and senior management to oversee the risks facing by a firm (Beasley, Clune and Hermanson, 2005).

The BOD is considered as an important element of corporate governance. The characteristics of the board members would determine its ability to monitor and control managers; provide information and counsel to mangers; monitor compliance with applicable rules and regulations; and link the corporation to the external environment (Carter, D'souza, Simkins and Simpson, 2010). The BOD delegates some of its authority to specific and specialized committees, namely audit committee, remuneration committee, nomination committee and risk management committee as a means of improving corporate governance.

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Historically, the responsibility for risk management in a firm is in the hands of an audit committee (Chan, Lau and Ng, 2011; Korosec and Horvat, 2005) as well as an internal auditor (IIA,2009). However, academic studies evidenced that the existing functions of an audit committee and internal auditor may be jeopardized if they are heavily involved in ERM activities (de Zwaan, Stewart and Subramaniam, 2011; Fraser and Henry, 2007; Subramaniam, McManus and Zhang, 2009). Currently, many firms are establishing a separate board-level risk management committee (RMC). The RMC is not new as firms in finance and insurance industry are required to establish a board-level RMC to manage credit risk issues (BNM, 2010). However, the practice among non-financial firms is still a voluntary. Even though it is not compulsory, there are non-financial firms that have recently established a specific committee to ensure the whole processes of firms' risk management activities are guided (Ruigrok, Peck, Tacheva, Greve and Hu, 2006).

The previous academic studies on the relationship of ERM and firm performance, e.g; Gordon, Loeb and Tseng (2009); Quon et al. (2009); Pagach and Warr (2010) and McShane, Nair and Rustambekov (2011), are in different settings and have given different findings. The novelty of this study is that it compares the relationship of ERM implementation with firms' performances and analyses any difference in performance between firms with board-level RMC and firms without board-level RMC.

2. Literature Review

The previous studies on ERM and firms' performances show mix evidences of the relationship. A study by Gordon et al.(2009) examines the relationship between ERM and performances of 112 US firms for the year 2005. The data from the 10Ks and 10Qs filed with the US Securities and Exchange Commission. The study found that ERM implementation improves firms' performances, but contingent upon five factors: environmental uncertainty, industry competition, firm size, firm complexity, and board of directors.

Hoyt and Liebenberg (2011) examine the ERM of insurance companies in the U.S and the implications of ERM programs on firms' value. A sample of 117 insurance firms (687 firm-year observation) is selected. ERM is measured based on the time period of ERM engagement. The study found a positive association between firms' value and the use of ERM. The study is supported by Waweru and Kisaka (2013) who examine the level of ERM implementation in firms listed on the Nairobi Stock Exchange – NSE. Their study sample is on 22 firms listed on NSE for the year ended December, 2009. The results show that an increase in the level of ERM implementation in companies positively contributes to the value of the companies.

A survey by Gates,Nicolas and Walker (2012) examines the practical value of ERM implementation. A sample of 271 audit and risk management executives who are members of the Conference Board in the UK responded to the questionnaire, that measures 8 ERM components: objective setting, identification of risk, risk assessment, risk response, risk information and communication, internal environment, control activities and risk monitoring. The study found that (a) positive relationship between enchanted management and improved perceived performance; (b) management are willing to implement ERM to improve perceived performance; (c) ERM improves risk management more visibly in medium and smaller firms and (d) better management leads to increase ability to meet strategic goals, reduce earnings volatility and increase profitability.

However, there are studies that found no significant relationship between ERM implementation and firms' performances. For example, Pagach and Warr (2010) examine the effect of adopting ERM principles on firms' long-term performance. They examine how financial assets and market characteristics change around the time of ERM adoption. Using a sample of 106 firms that announce the hiring of a Chief Risk Officer (CRO), they found that some firms that adopt ERM experience a reduction in earnings volatility. However, there is little impact of the ERM adoption on a wide range of firms' variables. Invariably, their study fails to support the proposition that ERM is value creating.

In Canada, Quon et al. (2012) examines the relationship between ERM information content and performances of non-financial companies listed on the Standard & Poor's (S&P) of the Toronto Stock Exchange (TSX) Composite Index for the year 2007 and 2008 through annual report content analysis. The period of economic recession and business performance had changed radially between those 2 years. The result found minor increases in risk exposure and risk consequence or risk management strategies. The study concludes that ERM information does not predict nor has any appreciable effect on business performance.

McShane et al. (2011) compares the impact of ERM with traditional risk management (TRM) on firms' performances. The samples are selected from S&P's ERM ratings for 82 publicly traded insurers. The other variables were obtained from the Thomson Banker One Databases. The study found a positive relationship between increasing level of TRM ratings and firm value and no additional increase in value for firms with higher ERM ratings. The study concludes that firms in higher ERM ratings do not perform due to environmental changes or cultural constraints.

Ballantyne (2013) analyses ERM and firms' financial performances based on a sample of 134 U.S. publicly traded companies using online survey and through public disclosure of the financial statements. The study found that ERM adoption is not associated with firm's financial performance. Similarly, in Malaysia, Tahir and Razali (2011) predict the relationship between ERM and firms' value based on a sample of 528 firms in 2007 using OSIRIS database. The firms' value is measured by Tobin's Q and is tested against the ERM variables, namely: firm sizes, leverage, ROA, international diversification and majority of ownership. The study evidences no significant relationship between ERM and firms' value.

The mix results from the prior studies motivate this study, but it will look into the behavior of Malaysian non-financial firms. This study specifically analyses the ERM implementation of firms with and without board-level RMC and their financial performances. Thus, it is hypothesized that:

H1: There is a significant difference in the relationship of ERM implementation in firms with and without board-level RMC and their financial performances

3. The Methodology, Model and Analysis of Data

This study has conducted an empirical study covering 74 main firms that have established a board-level RMC and 74 control firms that have implemented ERM but without board-level RMC. The control firms were selected among firms that have the same size of main firms and within the same industry. All 148 firms are non-financial firms listed on the Bursa Malaysia for the 5 years from 2009 to 2013 and equals to 740 firm-years. The content analysis was employed as the research instrument and the data were collected from

ThomsonOne.com database, OSIRIS database and corporate annual reports. This study is on non-financial firms because financial firms are compulsory to establish board-level RMC (BNM, 2010). The study would like to seek whether there is any difference in the relationship of ERM implementation and performance of firms with and without board-level RMC.

The dependent variable, which is the firms' financial performances are measured by Return on Assets-ROA, Return on Equity-ROE and Tobin's Q. Tobin's Q is calculated based on Ghazali (2012)'s which is year end firm's market value divided by the book value of assets. All of this information was collected from ThomsonOne.com database. The independent variable is the ERM index, which is the modified version of Gordon et al. (2009). The index is based on the framework by The Committee of the Sponsoring Organizations of the Treadway Commission (COSO)'s for achieving a firm's objective, namely; *strategy, operation, reporting and compliance* (COSO, 2004)

Strategy refers to the way a firm positions itself in the marketplace relative to its competition (Gordon et al. 2009). When executing its strategy, a firm tries to develop a competitive advantage over participants in the same industry.This competitive advantage should lower firm's overall risk of failure and thus, increases firm's performance and value. There are 3 measures of strategy:

Strategy 1 = **(Sales $_{i}$ - $\mu_{Sales)i}$ / σ Sales;** where Sales $_{i}$ = Sales of firm *i* in year 1 ; μ_{Sales} = Average industry sales in year 1 and σ Sales = standard deviation of sales of all firms in the same industry (Gordon et al. 2009).

Strategy 2 = **(β_i - $\mu_{\Delta\beta)}$ / $\sigma_{\Delta\beta}$; where** $\Delta\beta$ = - (ßi in year 1 - ßi in year 0); the ßi = firm is Beta; $\mu_{\Delta\beta}$ = average industry Δß in the year 1 (Gordon et al. 2009).

Strategy 3 is based on international diversification, which is the percentage of sales outside company over total sales (Bansal, 2005).

Operations can be measured as the input–output relation within the process of a firm's operations (Banker, Datar and Kaplan , 1989). More output for a given level of input or less input for a given level of output means better operating efficiency. Higher operating efficiency should lower a firm's overall risk of failure, and thus increase it performance and value. This study uses 2 measures of Operation:

Operation 1 = Sales / Total assets (Gordon et al. 2009)

Operation 2 = Operating cash flow / Net sales (revenue) (Jooste, 2006)

Reporting concept means poor financial reporting should increase firm's overall risk of failure and thus, decreases its performance and value (Cohen, Krishnamoorty and Wright, 2004). Reporting is measured as (normal accruals) / (normal accruals + abnormal accruals); where normal accruals is total accruals – abnormal accruals (Gordon et al. 2009). Total accrual is defined as income before extraordinary items – operating cash. The abnormal accruals are the error term from the regression model by Jones (1991) shown below:

$(TA_{ijt}) / (A_{ijt-1}) = \alpha_{jt} [1/ (A_{ijt-1})] + \beta_{1jt} [(\Delta REV_{ijt})/ (A_{ijt-1})] + \beta_{2jt} [PPE_{ijt} / (A_{ijt-1}] + e_{ijt}$

Where t = year 2009, TA_{ijt} = total accruals for firm *i* in industry *j*, A_{ijt-1} = total assets for firm *i* in industry *j*, ΔREV_{ijt} = change in net revenues for firm *i* in industry *j*, PPE_{ijt} = gross property plant and equipment for firm *i* in industry *j*, and e_{ijt} = error term for firm *i* in industry *j*.

Compliance is where increase compliance with applicable laws and regulations should lower a firm's overall risk of failure, thus increase its performance and value (Gordon et al. 2009) and is measured as Auditor fees /Total assets.

Thus, the ERM Index (ERMI) below is derived from the sum of the indicators discussed above:

$$ERMI = \Sigma Strategy + \Sigma Operations + \Sigma Reporting + \Sigma Compliance$$

The Panel Data Analysis is used to analyze the data using Stata13 software. The Panel Data analysis is used because of the nature of the data which observes on the same firms in several time periods. There are 3 statistical models employed to analyze the data:

Model 1:
$ROE_{it} = \alpha_{it} + \beta 1_{it}$ lermi + e_{it},

Model 2:
$ROA_{it} = \alpha_{it} + \beta 1_{it}$ lermi + e_{it},

Model 3:
Tobin'$sQ_{it} = \alpha_{it} + \beta 1_{it}$ lermi + e_{it},

In Panel Data Analysis, poolability test must be conducted using Breusch and Pagan Langragian Multiplier (LM) Test developed by Breusch and Pagan (1979). The null hypothesis stated that the model regression consists constant variance across observations against the alternative that variance are not constant across observations. Rejecting the null (p-value < 0.05) indicates that the model regression can be pooled using the panel data estimators, which are Fixed Effect and Random Effect estimators, rather than Ordinary Least Square (OLS). Later, the Hausman Specification test, developed by Hausman (1978) is conducted to select either fixed or random effect estimator. The null hypothesis of this test suggests estimating the panel data using random effect estimator, while the alternative suggests the fixed effect model is the appropriate estimator. Rejecting the null (p-value < 0.05) indicates the fixed effect model is to be used. The data are also tested for heteroskedasticity problem using Modified Wald Statistics model by Greene (2000) and also Wooldridge test for auto-correlation in panel data.

4. Findings and Discussions

Based on observation of 740 firm-years, Table 1 below shows the descriptive information for both the main firms and control firms.

Table 1: Descriptive Statistics

	Main firms N=370, n =74, T=5			Control firms N=370, n =74, T=5		
Variables	Mean	Min	Max	Mean	Min	Max
ermi	2.9422	0.1377	30.3740	0.9686	-0.1966	2.4516
roe	0.1620	0.0003	4.3117	0.1105	0.0008	1.1731
roa	0.0788	0.0008	2.1222	0.0619	0.0003	0.3145
tobinsq	0.6058	0.0179	5.5706	0.5719	0.0306	3.8071

The minimum and maximum ERM indexes of main firms are 0.1377 and 30.374 respectively, and the average index is 2.9422. The average, maximum and minimum ROE are 16.20%, 431.17% and 0.03% respectively. For ROA, the average, maximum and minimum amounts are 7.88%, 212.22% and 0.08% respectively. The Tobin's Q results show an average of 0.6058, the maximum amount of 5.5706 and the minimum amount of 0.0179. The minimum and maximum ERM indexes of control firms are -0.1966 and 2.4516 respectively, and the average index is 0.9686. The average, maximum and minimum ROE are 11.05%, 117.31% and 0.08% respectively. For ROA, the average, maximum and minimum amounts are 6.19%, 4.70% and 0.03% respectively. The Tobin's Q results show an average of 0.5716, the maximum amount of 3.8071 and minimum amount of 0.0306.

Table 2 shows the panel data results of both firms where firms' performances are measured by ROE. For main firms, the Breusch Pagan LM Test gives a significant result at p-value < 0.05 and the Hausman test resulted in p-value > 0.05. The random effect is the final model for this relationship. The *lermi* beta coefficient of 0.2317 shows a positive, but not significant relationship, between ERM implementation and ROE. If there is no ERM activity, the relationship will be negative as depicted in *Constant* beta coefficient -2.8468. In control firms, the fixed effect is a final model because the Hausman test resulted in p-value< 0.05. The *lermi* beta coefficient of 0.0919 shows a positive, but not significant relationship, between ERM implementation and ROE. If there is no ERM activity, the relationship will be negative as depicted in *Constant* beta coefficient -2.7109.

Table 2: Panel Data Results where firms' performances are measured by ROE

	Main Firms				Control firms			
	RE	FE	OLS	OLS HSC	RE	FE	OLS	OLS HSC
Constant								
β	-2.8468	-2.7713	-2.9386	-2.9386	-3.0801	-2.7109	-3.2436	-2.7109
t / z value	-14.73 ***	-14.13 ***	-17.16 ***	-16.49 ***	-18.22 ***	-12.12 ***	-23.84 ***	-12.42 ***
lermi								
β	0.2317	0.1548	0.3253	0.3253	0.4730	0.0919	0.6417	0.0919
t / z value	1.38	0.80	2.02 **	1.80	3.02 ***	0.41	4.94 ***	0.41
Breusch Pagan LM Test - χ^2	83.66 ***		-	-	50.16 ***		-	-
Hausman Test - χ^2	0.66		-	-	5.42 **		-	-

*Note : ***, ** and * denote significant at 1%, 5% and 10% respectively. RE – Random Effect ; FE – Fixed Effect; OLS – Pooling OLS; OLS HSC – OLS Hetero & Serial Correlation*

Table 3: Panel Data Results where firms' performances are measured by ROA

	Main Firms				Control firms			
	RE	FE	OLS	OLS HSC	RE	FE	OLS	OLS HSC
Constant								
β	-3.1103	-3.0340	-3.2165	-3.2165	-3.4451	-3.0552	-3.5174	-3.0552
t / z value	-20.34 ***	-20.01 ***	-23.68 ***	-20.36 ***	-23.76 ***	-13.6 ***	-28.04 ***	-10.06 ***
lermi								
β	0.1206	0.0429	0.2289	0.2289	0.3518	-0.0506	0.4265	-0.0506
t / z value	0.92	0.29	1.79 *	1.54	2.58 **	-0.22	3.56 ***	-0.16
Breusch Pagan LM Test- χ^2	99.95 ***		-	-	11.99 ***		-	-
Hausman Fixed Test –- χ^2	1.22		-	-	4.91 **		-	-

*Note : ***, ** and * denote significant at 1%, 5% and 10% respectively. RE – Random Effect ; FE – Fixed Effect; OLS – Pooling OLS and OLS HSC – OLS Hetero & Serial Correlation*

The panel data results of both firms where firms' performances are measured by ROA is shown in Table 3 above. For main firms, the random effect is the final model for this relationship as the Breusch Pagan LM Test gives a significant result at p-value < 0.05. The *lermi* beta coefficient of 0.1206 shows a positive, but not significant relationship, between ERM implementation and ROA. If there is no ERM activity, the relationship will be negative as depicted in *Constant* beta coefficient -3.1103. In control firms, the fixed effect is a final model because the Hausman test resulted in p-value< 0.05. The *lermi* beta coefficient of -0.0506 shows a negative, but not significant relationship, between ERM implementation and ROA. If there is no ERM activitiy, the relationship will be negative as depicted in *Constant* beta coefficient -3.0552.

Table 4: Panel Data Results where firms' performances are measured by Tobin's Q

	Main Firms				Control firms			
	RE	FE	OLS	OLS HSC	RE	FE	OLS	OLS HSC
Constant								
β	-0.8583	-0.8553	-0.8840	-0.8840	-0.8947	-0.8189	-1.4075	-1.4075
t / z value	-7.25 ***	-11.01 ***	-7.46 ***	-4.10 ***	-7.82 ***	-10.24	-13.09 ***	-6.30 ***
lermi								
β	-0.0319	-0.3501	-0.0057	-0.0057	0.0038	-0.0743	0.5332	0.5332
t / z value	-0.43	-0.46	-0.05	-0.02	0.05	-0.92	5.19 ***	2.39 **
Breusch Pagan LM Test- χ^2	453.35 ***		-	-	501.58 ***		-	-
Hausman Fixed Test –- χ^2	0.03		-	-	12.10 ***		-	-

*Note : ***, ** and * denote significant at 1%, 5% and 10% respectively. RE – Random Effect ; FE – Fixed Effect; OLS – Pooling OLS and OLS HSC – OLS Hetero & Serial Correlation*

Table 4 shows the panel data results of both firms where firms' performances are measured by Tobin's Q. The random effect is the final model to test the ERM and Tobin's Q as the Breusch Pagan LM Test gives a significant result at p-value < 0.05. The *lermi*

beta coefficient of -0.0319 shows a negative but not significant relationship, between ERM and Tobin's Q. If there is no ERM activities, the relationship will be negative as depicted in *Constant* beta coefficient -0.8583. In control firms, the fixed effect is a final model because the Hausman test resulted in p-value< 0.05. The *lermi* beta coefficient of -0.0743 shows a negative but not significant relationship, between ERM implementation and Tobin's Q. If there is no ERM activities, the relationship will be negative as depicted in *Constant* beta coefficient -0.8189.

5. Summary and Conclusions

This study aims to compare the relationship between ERM implementation in non-financial Malaysian public listed firms, firms with and without board-level RMC and their financial performance for the period 2009-2013. This study employs firms' performances proxied by ROE, ROA and Tobin's Q as the dependent variables and ERM index as independent variable. 3 regression panel data analysis models were analyzed using Stata13 software.

For the main firms, the regression results suggest that firms' performances measured by ROE and ROA showed negative relationship and Tobin's Q had a positive relationship with ERM implementation, but none of the model gives a significant result. For control firms, the regression results of firms' performances measured by ROE showed positive and not significant relationship with ERM. Firms' performances measured by ROA and Tobin's Q showed negative and not significant relationship with ERM implementation. This study supports Tahir and Razali (2011); Quon et al.(2012) and Ballantyne (2013) that there is no significant relationship between ERM and firms' performances. Specifically, this study suggests that there is no significant relationship on the ERM implementation among non-financial firms in Malaysia with their financial performance. Also, firms with RMC are not better off compared to firms without RMC.

The limitation of the study is that it focuses on the relationship of ERM implementation with firms' performances. This study suggests that future research should look into: (a) the moderating effect of RMC on the relationship of ERM and firm performance and (b) whether the establishment of RMC enhances ERM's implementation.

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