

# The Effect of Enterprise Risk Management on Firm Value: Evidence from Malaysian Technology Firms

*(Kesan Pengurusan Risiko Enterpris ke atas Nilai Firma: Bukti dari Firma-Firma Teknologi di Malaysia)*

Mohd. Hafizuddin Syah Bangaan Abdullah

Hawati Janor

(Faculty of Economics and Management, Universiti Kebangsaan Malaysia)

Mohamad Abdul Hamid

(Academic Director, Insaniah University College)

Puan Yatim

(UKM-Graduate School of Business, Universiti Kebangsaan Malaysia)

## ABSTRACT

*This paper aims to examine the relationship between ERM and firm value in Malaysia. In the past literature, ERM had been argued to increase firm value but empirical evidence shows mixed and inconclusive results. Using sample from 2004 to 2012, this paper furthers the analysis on the relationship between ERM and firm performance among technology firms in Malaysia. Indeed, technology industry is the fastest growing and a volatile industry, which requires continuous innovation. These make technology firms more prone to risk exposure. In analyzing this issue, dynamic panel data is employed to allow cross-sectional and time series analysis. Our results show that the implementation of ERM in the previous year has strong negative relationship with firm value at 1 percent significance level. It supports the argument that the effect of ERM is not immediately realized as well as entails high implementation cost. The findings provide useful input and insight in formulating new policy in relation to corporate governance, particularly ERM in Malaysia.*

*Keywords: Enterprise risk management; ERM; risk management; firm value; firm performance*

## ABSTRAK

*Kajian ini bertujuan untuk melihat hubungan di antara ERM dan nilai firma di Malaysia. Dalam kajian-kajian lepas, ERM dikatakan mampu untuk meningkatkan nilai firma tetapi bukti empirikal menunjukkan dapatan yang bercampur-campur dan berbeza-beza. Dengan menggunakan sampel dari tahun 2004-2012, kajian ini menganalisis hubungan di antara ERM dan nilai firma di kalangan firma-firma berasaskan teknologi di Malaysia. Ini adalah kerana sektor teknologi merupakan industri yang berkembang pesat dan mempunyai kemaruapan yang tinggi, di samping memerlukan inovasi yang berterusan. Ini menyebabkan firma-firma teknologi lebih terdedah kepada risiko. Untuk menganalisis dan mengupas isu ini, data panel dinamik digunakan untuk membolehkan analisis keratan rentas dan siri masa dibuat. Hasil daripada kajian ini mendapati bahawa pelaksanaan ERM pada tahun sebelumnya mempunyai hubungan negatif dengan nilai firma pada aras keertian 1 peratus dan seterusnya menyokong pendapat yang mengatakan bahawa kesan pelaksanaan ERM tidak akan dapat dilihat serta merta dan juga pelaksanaan ERM memerlukan kos yang tinggi. Kajian ini juga memberikan input dan pandangan yang berguna dalam memformulasi polisi berkaitan dengan urus tadbir, terutama pelaksanaan ERM di Malaysia.*

*Kata kunci: Pengurusan risiko enterprise; ERM; pengurusan risiko; nilai firma; prestasi firma*

## INTRODUCTION

Corporate risk management has become more important for businesses particularly in today's dynamic and emerging risk environment. Indeed, risk management as an essential part of corporate governance, vital for a firm in preserving its shareholder's interests as well as other stakeholders of the firm. In recent years, the approach of managing risk has shifted from silo to holistic approach, known as enterprise risk management (ERM). Silo approach limits the coordination between departments, resulting in inefficiencies in the distribution of risk management expenses (Hoyt & Liebenberg

2011). Therefore, ERM has emerged to improve on the traditional approach by coordinating overall risk exposures within the organization, in conjunction to risk appetite and corporate strategies. According to Lam (2003), effective risk management demands businesses to deal with both underlying risk and the interrelationships between risks.

The importance and benefits of ERM coupled with the increasing trend of ERM have motivated increasing research in this area. One of the major issues that had been examined includes the implications of ERM on firm performance. Although modern finance theories assert that risk management is irrelevant to firm value (see Markowitz

1952; Modigliani & Miller 1958; Sharpe 1964), the proponents of corporate risk management suggest that corporate risk management increases firm value, subject to the effectiveness of risk management in minimizing costs associate with imperfect capital market (Froot, Scharfstein & Stein 1993; Meulbroek 2002; Nocco & Stulz 2006; Smith & Stulz 1985; Stulz 1996; Tufano 1998).

However, empirical evidence from the perspective of ERM is rather mixed and ambiguous. Several studies find positive correlation between ERM implementation and firm performance or firm value (Baxter, Bedard, Hoitash & Yezegel 2013; Beasley, Pagach & Warr 2008; Gordon, Leob & Tseng 2009; Hoyt & Liebenberg, 2011), while others find negative relationship (Lin, Wen & Yu 2012). Nevertheless, two studies have been conducted in Malaysia examining the relationship between ERM and firm value creation. Specifically, Manab, Kassim and Hussin (2010) concluded that the main objective of financial firm of implementing ERM is business survival rather than value creation; whereas Tahir and Razali (2011) found no evidence in the relationship between ERM and Tobin's Q. The inconsistency in the evidence could be due to different measurements of ERM implementation, sample and time period. According to Bowling and Rieger (2005) and Gates (2006), ERM takes years to be fully implemented and to see the benefits. In other words, the benefits of ERM implementation could only be seen after one year or even a longer period. Indeed, this particular issue has been overlooked as most of the past studies employed static model to examine the relationship between ERM and firm value. Although this issue was initially raised by Hoyt and Liebenberg (2011), no further empirical test has been conducted. Therefore, this paper attempts to examine this issue by using dynamic panel model among technology firms in Malaysia from 2004 to 2012.

This paper enriches the rising literature of ERM by providing evidence from the emerging market as well as from a specific non-financial industry, i.e. technology sector. Indeed, most existing studies focus on insurance or banking industry (see Hoyt & Liebenberg 2011; McShane, Nair & Rustambekov 2011; Lin et al. 2012; Baxter et al. 2013) and limited study has been conducted on a specific non-financial industry. Furthermore, technology sector plays important roles in the economy and becomes the source of other industry to capture dynamic business environment including quality, productivity and profitability improvement. Indeed, technology industry is very volatile, requiring continuous innovation and technological improvement. Apart from being relentless in innovation to meet consumer demands (Ernst & Young 2014), technology firms are facing high competition that forces them to change corporate strategy. More technology firms are moving towards merger and acquisition and global expansion to maintain market share. According to the BDO Technology Risk Factor Report in 2014<sup>1</sup>, competition and high pricing pressure are the most cited risks for technology industry in the U.S. Therefore, relentless innovation, high completion and increasing in

size would make technology firms more prone to risk exposure.

The following sections are structured as follows. First, we present a brief literature on the relationship between ERM and firm value. Research design is presented in second section which includes sample selection, data collection, empirical method and hypothesis as well as regression model. Third, we depict empirical findings. Finally, conclusion and suggestion for future research are presented in the final section.

## LITERATURE REVIEW

Generally, ERM means managing full range of risks relevant to the firm by considering interrelation across risks. Indeed, good corporate governance through ERM manages risk exposure within a company's risk appetite as to ensure resources are appropriately allocated and maintain shareholder value creation. As a broad concept, ERM can be interpreted in different ways from one profession to another, based on the needs and priorities in managing different type and magnitude of risks. For example, Casualty Actuarial Society (2003) defines ERM as "*the discipline by which an organization in any industry assesses, controls, exploits, finances, and monitors risks from all sources for the purpose of increasing the organization's short- and long-term value to its stakeholders*"; while Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2004) describes ERM as "*a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.*" Despite various ERM definitions, the underlying of ERM concept is to deal with risks in holistic manner; and this done by considering both systematic and unsystematic risks. Indeed, ERM allows construction of risk portfolio; and Kleffner, Lee and McGannon (2003) suggested that portfolio approach and risk management are similar when one holds diverse investment portfolio. In other words, negative correlated risks will offset each other and result in lower total risk exposure. Furthermore, diversification strategy is able to minimize upside and downside risks for better performance in various economic circumstances (Catherine & Nurul Izza 2009).

In the past, scholars argued that risk management increases firm value through the effectiveness of risk management to reduce costs associate to imperfect capital market (e.g. Smith & Stulz 1985; Stulz 1996; Froot et al. 1993; Tufano 1998; Meulbroek 2002; Nocco & Stulz 2006). For instance, Stulz (1996) argued that only firms with lower tail outcomes will benefit from risk management, while other firms will see no benefit and could destroy the value by spending corporate their resources on risk management. As such, elimination

of costly lower-tail outcomes<sup>2</sup> is the main objective of risk management (Stulz 1996). Indeed, costly lower-tail outcomes are the sources of financial distress cost and may prevent the implementation of investment strategy. Furthermore, by minimizing the likelihood of financial distress, risk management (or specifically hedging) also enhances debt capacity (Stulz 1996; Leland 1998). As debt capacity increases, firm will be able to borrow more and increase its leverage. As a result, interest on debt increases and reduction in tax payment; which consequently enhanced firm value. In other words, high debt capacity (or high leverage) provides the incentive for hedging in consideration of the tax saving gained from interest deduction. In sum, lower-tail outcomes can be minimized as to smooth earnings and cash flow through reduction of total risk exposure (Kraus & Lehner 2012).

Consistently, the adoption of ERM decreases the volatility of stock price and earnings, reduces external capital costs, increases capital efficiency and creates synergies between different risk management activities (Miccolis & Shah 2000; Meulbroek 2002). According to Nocco and Stulz (2006), a well-designed ERM allows a firm to access capital market and other resources to maintain profitable growth of the firm. Therefore, managers must be able to utilize risk profile in evaluating risk-return tradeoff in their investment decisions within firm risk appetite. More important, ERM is capable of reducing earnings volatility from different sources of risks to prevent risk aggregation (Hoyt & Liebenberg 2011). In fact, any increase in total risk might possibly result in loss of value; and in the event the company forgoes a profitable project with positive net present value, the loss of value signifies permanent drop in value (Nocco & Stulz 2006). However, costs and benefits of ERM are firm specific (Beasley et al. 2008) and differ from one firm to another.

Nevertheless, empirical evidence on the relationship between ERM and firm performance or value is mixed and inconclusive. Prior to ERM, some studies on the relationship between traditional risk management (proxied by hedging or derivatives) and firm value demonstrated positive results (see Allayannis & Weston 2001; Carter, Rogers & Simkins 2006; Graham & Rogers 2002). Consistently, Beasley et al (2008) showed positive association between ERM adoption and firm performance. Specifically, they found that large non-financial firms with higher earnings volatility, lower leverage and limited cash reserves, and financial firms with limited cash reserves and higher leverage are likely to benefit from ERM adoption. These findings suggest that not all firms could taste the benefits of ERM; consistent with the argument of Stulz (1996).

Hoyt and Liebenberg (2011) discovered that ERM is positively correlated to firm value (as measured by Tobin's Q) in the U.S insurance industry from 1998 to 2005. Specifically, Q ratio for insurance companies that engaged in ERM is 20 percent higher than other insurance companies. Baxter et al. (2013) analyzed valuation effect of ERM in the U.S insurance and banking sector and found consistent results with Hoyt and Liebenberg (2011). The

adoption of ERM leads to an increase of 1.14 percent and 3.40 percent in ROA and Tobin's Q, respectively. More interesting findings are being reported in Beasley et al. (2008). Using ERM index to proxy ERM adoption, Gordon et al (2009) found consistent evidence as Beasley et al. (2008); but the relationship between ERM and firm performance (measured by one year excess stock market return) depends on the accuracy to match ERM with firm specific's factors, i.e. environmental uncertainty, industry competition, firm size, firm complexity and monitoring by the board of directors.

On the other hand, Lin et al. (2012) suggested that ERM adoption can be a value destructor. They conducted a study on 85 publicly traded property and casualty insurers in the U.S. from 2000-2007. Lin et al. (2012) used both economic value and accounting based measurement, i.e. Tobin's Q and ROA to proxy firm value. Their analysis showed a negative association between ERM and firm value. Specifically, ERM adoption leads to 5% and 4% reductions in Tobin's Q and ROA respectively. They argued that the negative association could be due to ERM complexity (Fraser, Schoening-Thiessen & Simkins 2008) and the high cost of ERM implementation (Beasley et al. 2008; Pagach & Warr 2010). This finding is similar to the conclusion found in corporate hedging studies (see Callahan 2002; Jin & Jorion 2006; Khediri & Folus 2010).

Using ERM rating, McShane et al. (2011) found no evidence of increasing value as ERM takes place among insurance companies in the U.S. Specifically, they found that firm value increases as more sophisticated TRM takes place; but this does not increase as firm achieves ERM. In the emerging market, Manab et al. (2010) discovered that the main objective of EWRM adoption among financial companies in Malaysia is survival rather than value creation. Moreover, Tahir and Razali (2011) and Chen (2012) found insignificant result for public listed companies in Malaysia and Taiwan, respectively.

The discussion on the above literature is mostly based on static model, which indicates the immediate effect of ERM. However, ERM takes time to be fully implemented and effects of ERM on firm performance may not be immediately realized. Therefore, it is worth to examine this issue of enriching the dimension by the way ERM affects firm performance or value.

## RESEARCH DESIGN

### SAMPLE SELECTION AND DATA COLLECTION

The sample for this paper is technology industry in Malaysia based on industry classification by Osiris. The period of 2004 to 2012 is chosen as ERM becomes a global issue after the publication of Enterprise Risk Management Framework by Committee of Sponsoring Organizations of the Treadway Commission (COSO) in 2004. Most of the data are only available up to 2012. To be included, a firm

must be listed on Bursa Malaysia before or on the year 2004 and each firm must have all the data of the variables used to support research framework and the hypotheses. This is very important as to ensure that the result is not affected by the sample with incomplete data (de Vaus 2002). Furthermore, all companies (ERM user or non-user) that meet the criteria are included in the research sample. Initial sample from Osiris database is 108 technology firms. After eliminating firms with incomplete data, our final sample is reduced to 26 firms. Out of 26, only nine firms are ERM users and 15 firms are non-users. The total of 26 technology firms yielded 236 firm-year observations. However, as this study employs dynamic model which involves lag variables, the firm-year observation reduces to 208.

Financial data are collected from Osiris. However, for ERM activity identification, we go through each firm's annual report from 2004 to 2012 as ERM adoption cannot be easily observed. Specifically, we perform separate keyword searches for each firm using individual words, axiom and acronyms. This approach had been used in the past literature (see Chen 2012; Golshan & Rasid 2012; Hoyt & Liebenberg 2011; Liebenberg & Hoyt 2003). The keywords include "enterprise risk management," "enterprise-wide risk management," "chief risk officer," "risk committee," "strategic risk management," "consolidated risk management", "holistic risk management," "comprehensive risk management" and "integrated risk management." The first four keywords are prominent terminologies in recent years and the remaining is identical to ERM (Liebenberg & Hoyt 2003). We review each of the results in the context of enterprise risk management to decide whether each result refers to ERM implementation. Finally, each result that refers to ERM is coded and dated in accordance to the key word that generates the results.

#### EMPIRICAL METHOD

This study aims to examine the relationship between ERM and firm value in Malaysian context. Following the past literature in risk management, we employ Tobin's Q to represent firm value. Tobin's Q is calculated by dividing the sum of market value of equity plus book value of liability with book value to assets, a similar measurement used in Hoyt and Liebenberg (2011) and McShane et al. (2011). Indeed, Tobin's Q has been used to quantify the valuation effect of several firm characteristics such as firm size (e.g. Allayannis & Weston 2001; Beasley et al. 2008; Tahir & Razali 2011), leverage (Chen 2012; Lin et al. 2012; Razali, Yazid & Tahir 2011), profitability (e.g. Allayannis & Weston 2001; Hoyt & Liebenberg 2011; Tahir & Razali 2011), cash reserves (Beasley et al. 2008) and growth opportunity (Allayannis & Weston 2001; Jin & Jorion 2006; Lin et al. 2012). Furthermore, nine out of 10 studies had employed Tobin's Q as a measure for firm value in the literature of traditional risk management from 2001-2005 (Smithson & Simkins 2005).

Specifically, Tobin's Q is modelled as a function of ERM and five control variables. ERM is defined as 1 for firm-years beginning with first evidence of ERM usage and subsequent years, and equal to 0 for firm-years before the ERM adoption. For instance, a firm adopted ERM in 2007 will be assigned the value 1 for years 2007 to 2012 and 0 before year 2007, i.e. 2004-2006. This measure has been adopted in Hoyt and Liebenberg (2011). ERM needs time to be fully implemented (Bowling & Rieger 2005; Gates 2006) and its effect on firm value may take time to realize (Hoyt & Liebenberg 2011). Some of studies on the relationship between ERM and firm performance find positive relationship (Beasley et al. 2008; Gordon et al. 2009; Hoyt & Liebenberg 2011; Baxter et al. 2013) and support the theoretical argument on the valuation effect of ERM (Meulbroek 2002; Miccolis & Shah 2000; Nocco & Stulz 2006). However, ERM is often viewed as a costly program and may harm the shareholders' interest if the cost of ERM is greater than it benefits (Beasley et al. 2008; Pagach & Warr 2010). This cost could be arisen from the organization's risk culture (Rochette 2009) and greater necessity for human resources and information technology system (McShane et al. 2011). Subsequently, ERM requires longer period to be fully implemented (Bowling & Rieger 2005; Gates 2006), and this could further increase implementation cost. As ERM implementation in Malaysia is still in the early stage (Tahir & Razali 2011), it may lead to high cost of ERM implementation; due to lack of expertise as well as low level awareness on the entire ERM program. Therefore, based on this argument, we expect the ERM implementation in the previous year has negative association with firm value in the following year.

Empirical finding from past studies suggest that other attributes may affect firm value such as firm size, leverage, profitability, cash reserves and growth opportunity. Indeed, firm leverage and firm size are the most cited control variables in the study of risk management (Allayannis & Weston 2001; Anderson, Duru & Reeb 2009).

*Firm Size* Past literature argued that as a firm becomes larger (or become public companies), agency conflict is likely to occur (e.g. Jensen & Meckling 1976; Jensen 1986). Indeed, the agency conflict between managers and shareholders erodes shareholder wealth, and subsequently reduces firm value. Allayannis and Weston (2001), Carter et al. (2006) and Tahir and Razali (2011) found negative correlation between firm size and Tobin's Q. However, larger firm has greater resources and diverse expertise to increase firm value through mass production (Majumdar 1997) or manage strategic risks effectively. On empirical evidence, Jin and Jorion (2010), Beasley et al. (2008), Hoyt and Liebenberg (2011) and Lin et al. (2012) demonstrated a positive link between firm size and firm value. Following to Pagach and Warr (2011) and Golshan and Rasid (2012), we use natural logarithm of total assets to measure firm.

*Leverage* For non-financial firms, total liability to market value of equity (i.e. debt to equity ratio) is the common

proxy for firm leverage (e.g. Beasley et al. 2008; Razali et al. 2011; Tahir & Razali 2011). Therefore, we measure leverage by utilizing debt to equity ratio. Jensen (1986) suggested that the inclusion of debt in firm capital structure can reduce the cash available to managers through the minimization of agency cost of free cash flow. However, greater leverage could increase firm risk and exposure to financial distress as well as underinvestment problem. In other words, high level of debt may limit the ability of the firm to seize the opportunities to invest in projects with positive net present value. Consequently, financially distressed firms are prone to reduction in debt ratings and have higher borrowing costs (Beasley et al. 2008). On the empirical evidences, Beasley et al. (2008), McShane et al. (2011), Chen (2012) and Lin et al. (2012) found inverse correlation between leverage and firm value. Prior to ERM, Allayannis and Weston (2001) reported negative linkage between leverage and industry adjusted Q.

**Profitability** Generally, profitability is the primary purpose of a firm. By having high profit, it shows that some firms generate higher revenue than costs. From investors' perspective, profitable firms offer greater future opportunity; hence, making these firms more attractive. Indeed, Allayannis and Weston (2001) suggested that profitable firms tend to be traded at premium. On empirical evidence, profitability is positively correlated with firm performance (e.g. Allayannis & Weston 2001; Hoyt & Liebenberg, 2011; Tahir & Razali 2011). Thus, return on assets (ROA), calculated as net income divided by total assets, is included to control for profitability.

**Cash Reserves** According to Smith and Stulz (1985), lower cash availability increases the possibility of levered firm to be financially distressed. Indeed, limited cash reserves and resources may force a firm to invest in any available fund for its corporate risk management as to protect firm value. This is because they might not be able to buffer any unexpected shocks or losses. Beasley et al. (2008) found that limited cash holding is one of the characteristics of financial and non-financial firms likely to benefit from ERM adoption. Similar to Beasley et al. (2008), we measure cash reserves as total cash or cash equivalent divided by total liability

**Growth Opportunity** Lin et al. (2012) suggested that growth opportunity, as measured by three year premium growth, is positive and significant to Tobin's Q. This finding is consistent with those studies of hedging such as Allayannis and Weston (2001) and Jin and Jorion (2006). Following Allayannis and Weston (2001), this study uses natural log of capital expenditure to total sales as a measurement for level of investment to facilitate future growth. Generally, lower ratio indicates better position as small fraction of capital could generate higher sales (and indicates greater investment growth prospect). As the market value of firm is the present value of all expected future cash flows (Myers 1977), lower CAPEX (or high investment growth) would increase firm value.

#### REGRESSION MODEL

Regression analysis is used to identify the relationship between dependent variables and explanatory variables. This study aims to examine the relationship between the implementation of ERM and firm value as measured by Tobin's Q using the following dynamic panel model. Under this model, ERM is transformed into lag variable to examine the effect on firm value. Furthermore, all control variables are also converted into lagged variable as to avoid endogeneity problem (Altuntas, Berry-Stolzle & Hoyt 2011). Therefore, regression model for this study is shown below:

$$Q_{it} = \beta_0 + \beta_1 ERM_{it-1} + \beta_2 SIZE_{it-1} + \beta_3 LEV_{it-1} + \beta_4 CASH_{it-1} + \beta_5 ROA_{it-1} + \beta_6 CAPEX_{it-1} + \varepsilon_{it}$$

where,

Q	: Measures firm performance and calculated as $\log[(\text{market value of equity} + \text{book value of liability}) / \text{book value of assets}]$
ERM	: Dummy variable; 1 for firm-years beginning with first proof of ERM adoption and subsequent years, and 0 for firm-years before the ERM
SIZE	: Measures firm size and calculated as natural logarithms of total assets
LEV	: Measures firm leverage (total liabilities / market value of equity)
CASH	: Measures cash reserves (Cash and cash equivalents / total liabilities)
ROA	: Measures profitability (net income / total share outstanding)
CAPEX	: Measures growth opportunity i.e. $\log(\text{capital expenditures} / \text{total sales})$
$\varepsilon$	: Error term

As the sample comprises cross-sectional data and time series data (26 technology firms over the period of 9 years, from 2004 to 2012), panel data methodology is employed in this paper. According to Baltagi (2008), panel data is able to produce results that are simply undetectable in pure cross-section or pure time-series data. However, regression test under panel data must be incorporated with specific method, either with random effect model or fixed effect model. Generally, fixed effect model assumes the differences in intercepts across the groups or time period, while random effect model looks at the differences in error terms. In choosing the appropriate estimation model for panel data, Hausman (1978) test is employed in most cases. It basically tests whether individual effect is related to explanatory variables. The null hypothesis is that the effect is unrelated to explanatory variable. If the test is significant at, at least 0.05, fixed effect model is a better fit to the data compared to random effect model.<sup>3</sup> Hausman test in Table 1 is significant at 0.01; and therefore, random effect model is rejected in favor of fixed effect model.

TABLE 1. Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	19.4564	6	0.0035

In addition, White test and Wooldridge tests are used to detect the problems of heteroscedasticity and autocorrelation, respectively. The findings of White test in Table 2 reveal the existence of heteroscedasticity problem. Specifically, it indicates that the variance of error terms is not constant across observations. Wooldridge test is conducted to test the null hypothesis i.e. existence of first order autocorrelation. Based on the result in Table 3, the F-statistics are significant at 5 percent level; and therefore null hypothesis is rejected. To overcome these problems, robust standard error is often used as it is consistent to both heteroscedasticity and autocorrelation. Indeed, Stock and Watson (2006) highlighted that in the presence of heteroscedasticity and autocorrelation, robust standard error such as clustering is the ultimate choice. Therefore, as a remedial for heteroscedasticity and autocorrelation, robust standard error procedure is conducted using the statistical and econometric software available in Stata 12.

TABLE 2. Heteroscedasticity test: White

Chi-Square (n.R <sup>2</sup> )	72.69	Prob > Chi-Square	0.0000
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TABLE 3. Wooldridge Test for Autocorrelation

F-statistics (1, 25)	4.412	Prob > F-Statistics	0.0459
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## EMPIRICAL FINDINGS

### DESCRIPTIVE STATISTICS

Table 4 presents the descriptive statistics that contain the values of mean, median and standard deviations of each variable. Firm performance as measured by log of Tobin's Q is the dependent variable and ERM, SIZE, LEV, CASH, CAPEX and ROA are explanatory variables. The average firm value (Q) among technology firms is at 1.19 with a median of 0.996. However, the dispersion of firm value across the sample is relatively low as shown by standard deviation of 0.68. ERM has a mean score of 0.16, median of 0.00 and standard deviation of 0.37. Generally, there is low dispersion of ERM adoption among the samples. SIZE as measured by natural logarithms of total assets yields approximately RM134 million in mean (the anti-log of 11.80), RM98 million in median and RM3 million in standard deviation. Therefore, the average total assets in sample firms is RM133 million. On average, firms across the samples have more equity than debt in their capital structures as indicated by LEV mean value of 0.95.

Cash reserves, CASH is low as shown by mean score of 1.14, median of 0.48 and 2.16 in standard deviation. This indicates that only 1.14 percent of firm's total liabilities are financed by assets in the form of cash. However, the value of standard deviation signifies that cash reserves varied across technology firms in the samples. Growth opportunity, CAPEX is measured by percentage of total capital expenditure against total sales. Based on the descriptive statistics, it shows that firms in the samples have an average growth opportunity of 7.06 percent and a median of 3.40 percent. This result is slightly higher than mean value of 0.4 percent in Spano (2007). However, based on the standard deviation of 8.76 percent, there is a high significant dispersion in the growth opportunity among firms. This indicates the existence of firms with positive as well as negative growths. Firms' return on assets (ROA) is highly dispersed as shown by standard deviation of 12.83 percent. On average, every RM1 asset only generates RM0.03 return across the sampled firms.

TABLE 4. Descriptive statistics

Variables	N	Mean	Median	Standard Deviation
Q	234	1.194	0.996	0.677
ERM	208	0.158	0.000	0.366
SIZE	208	11.808	11.495	1.117
LEV	208	0.951	0.598	1.178
CASH	208	1.144	0.475	2.158
CAPEX	208	7.061	3.401	8.759
ROA	208	3.196	3.813	12.831

## MULTIVARIATE ANALYSIS

The multivariate analysis is based on fixed effect method as Hausman test produces significant result (p-value = 0.0035). Table 5 reports the results of fixed effects dynamic panel with lag explanatory variables. Variance inflation factors (VIF) of each explanatory variable are below 4 and indicate the absence of serious collinearity problem; consistent with the maximum VIF value of 5 as recommended by Rogerson (2001). Indeed, common acceptable VIF value is 10 (Hair, Anderson, Tatham & Black 1995; Kennedy 1992). Moreover, the overall percent is correctly predicted as shown by R<sup>2</sup> at approximately 73 percent and 68 percent for adjusted R<sup>2</sup>.

Consistent with our prediction, ERM implementation in the previous year has strong negative association with firm value in the following year at 1 percent significance level. Specifically, ERM user firms are valued at approximately 47 percent lower than non-user firms. This finding is consistent with Lin et al. (2012) in their analysis on the valuation effect of ERM in the U.S. insurance industry as well as the empirical findings of hedging (Callahan 2002; Jin & Jorion 2006; Khediri & Folus 2010). Indeed, the infancy stage of ERM in Malaysia (Tahir & Razali 2011)

and coupled with high cost of implementation (Beasley et al. 2008; McShane et al. 2011; Rochette 2009; Pagach & Warr 2010) may cause ERM to inversely affecting firm value among technology firms in Malaysia.

Three of the control variables are statistically significant in explaining firm value.  $SIZE_{t-1}$  has a strong influence in explaining firm performance. The negative sign of the  $SIZE_{t-1}$  coefficient indicates that as firm size increased in the previous year, it decreased firm value in the following year. Therefore, this finding supports the notion that agency conflict increases as firms grow (Jensen & Meckling 1976; Jensen 1986); and is consistent with the previous literature (Allayannis & Weston 2001; Carter et al. 2006; Tahir & Razali 2011).  $CASH_{t-1}$  is negatively correlated with firm value at 5 percent significance level. This means, large cash reserve in the previous year will decrease firm value in the following year. Interestingly, the effect of cash reserve is inconsistent with the argument by Smith and Stulz (1985). One of the explanations is that holding large cash allows managers to spend unwisely and this tends to go against shareholders' interest (Jensen 1986). Finally,  $CAPEX_{t-1}$  has negative effect on firm value at 10 percent significance level. However, this finding contradicts the result of Allayannis and Weston (2001), Jin and Jorion (2006) and Lin et al. (2012). It could be due to the harsh decision by managers to invest in non-profitable project to serve short term self-benefits out of shareholders' pocket. As a result, it decreases firm value in the long term.

TABLE 5. Fixed effect regression results on firm value

Variables	Q	Collinearity test (VIF)
Intercept	3.067 (3.66)***	
$ERM_{t-1}$	-0.469 (-35.63)***	3.357
$SIZE_{t-1}$	-0.245 (-3.49)***	3.455
$LEV_{t-1}$	-0.009 (-0.37)	3.258
$CASH_{t-1}$	-0.019 (-2.06)**	3.260
$CAPEX_{t-1}$	-0.047 (-1.78)*	3.290
$ROA_{t-1}$	0.002 (0.80)	3.249
R <sup>2</sup>	0.732	F-statistic 15.479
Adjusted R <sup>2</sup>	0.684	Prob (F-statistic) 0.000
N	208	

Value in parentheses is t-statistic.

\*\*\*, \*\* and \* are indicating 1%, 5%, and 10% significance level, respectively.

## CONCLUSION

This study attempts to examine the impact of ERM implementation on firm value, measured by the natural log of Tobin's Q. The study employs fixed effect dynamic panel data to examine the valuation effect of ERM. Our findings support our prediction that ERM implementation is likely to affect firm performance adversely; consistent to the findings of Lin et al. (2012). Specifically, the

adoption of ERM in the previous year has an adverse effect on firm value in the following year. It also supports the arguments by Bowling and Rieger (2005), Gates (2006) and Hoyt and Liebenberg (2011) on the time constraint of implementing ERM. Furthermore, ERM practice in Malaysia is still in infancy stage (Tahir & Razali 2011) and lacks ERM expertise. Other reasons are that managers may encounter greater challenges in cultivating risk culture (Rochette 2009) and ERM requires high cost of implementation (see Beasley et al. 2008; Pagach & Warr 2010) including investment in human resources and information technology system (McShane et al. 2011). In addition, firm size, cash reserves and opportunity growth are also significant in explaining firm value.

The main finding of this study shows that ERM is negatively related to firm value and contradicts the arguments by corporate risk management proponents such as Smith and Stulz, (1985), Stulz (1996), Froot et al. (1993), Tufano (1998), Meulbroek (2002) and Nocco and Stulz (2006). However, ERM is firm specific and the approaches as well as resources deployment may vary among firms. Thus, the benefits and costs associated to ERM differ from one firm to another. Furthermore, findings of this study provide valuable insight for regulators in formulating policy and guidelines related to corporate governance in Malaysia. As ERM is a relatively new program in Malaysia, regulators could formulate policy to improve disclosure on financial position as well as risk profile. Indeed, greater disclosure on firm risk profile may help to reduce information asymmetry and subsequently adds value to the firm (Hoyt & Liebenberg 2011). In addition, the finding of this study can also be used to improve the awareness among listed companies that the valuation effect of ERM does not happen immediately. It requires ultimate commitments from all organization members as well as financial pledges as to ensure the success of ERM program and provides greater benefits in the long run.

Similar to other studies in social science, this study also encounters several limitations. First, our key search approach in identifying ERM adoption may not be able to capture all the ERM activities. Furthermore, sample size of this study is relatively small with 234 firm-year observations from technology industry. It may affect the generalization of findings to other industry. However, several studies in the past had conducted their analyses on small sample size. For instance, McShane et al. (2011) only analyzed 82 observations while Baxter et al. (2013) utilized 165 firm-year observations. Future study may want to look into the overall industry and with longer time period. Another prospect of research is to examine the effect of mediating and moderating variables, such as agency cost and cost of capital to further understand the association between ERM and firm value.

## END NOTES

- <sup>1</sup> 2015 BDO Technology Risk Factor Report, available online at <http://www.bdointernational.com>
- <sup>2</sup> Stulz (1996) describes firms with lower tail outcomes as high leverage, limited cash reserves and volatile earnings.
- <sup>3</sup> If hypothesis null is rejected means that random effect model violates Gauss-Markov assumptions and become biased and inconsistent estimates. On the other hand, fixed effect model remains unbiased and consistent

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- Mohd. Hafizuddin Syah Bangaan Abdullah  
(corresponding author)  
Faculty of Economics and Management  
Universiti Kebangsaan Malaysia  
43600 UKM Bangi, Selangor, MALAYSIA.  
E-Mail: m\_hafiz@ukm.edu.my
- Hawati Janor  
Faculty of Economics and Management  
Universiti Kebangsaan Malaysia  
43600 UKM Bangi, Selangor, MALAYSIA.  
E-Mail: hawati@ukm.edu.my
- Mohamad Abdul Hamid  
Academic Director  
Insaniah University College  
09300 Kuala Ketil, Kedah, MALAYSIA.  
E-Mail: drmohdhamid@insaniah.edu.my
- Puan Yatim  
UKM-Graduate School of Business  
Universiti Kebangsaan Malaysia  
43600 UKM Bangi, Selangor, MALAYSIA.  
E-Mail: puan@ukm.edu.my

