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Impact of Enterprise Risk Management on Firm Performance and Value: A Panel Data Analysis of Malaysian Firms

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Abstract

This study investigates the impact of enterprise risk management (ERM) implementation on firm performance and firm value among Malaysian listed companies from 2010 to 2024. Empirical evidence on ERM outcomes in the Malaysian context remains limited, particularly regarding studies that simultaneously examine financial performance and firm valuation. By jointly analyzing these measures, the study seeks to determine which performance dimension is more significantly influenced by ERM and whether Malaysian investors incorporate risk management practices into firm valuation assessments. The analysis covers 11,285 firm-year observations, using a comprehensive ERM index based on the COSO ERM framework and a fixed-effects panel regression with robust standard errors. The results indicate that ERM implementation is positively associated with both return on assets (ROA) and Tobin's Q, with a stronger relationship observed for financial performance. This suggests that, although Malaysian investors acknowledge ERM practices in their valuation decisions, ERM does not yet constitute a primary driver of firm value. These findings further support the resource-based view, indicating that ERM may function as a strategic organizational capability that contributes to sustained competitive advantage.

Keywords: Enterprise Risk Management, Risk Management, Resources-Based View, Firm Performance

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1.0 Introduction

Contemporary globalization has fundamentally transformed the operational landscape for modern enterprises, with organizations becoming increasingly embedded within international trade networks as both suppliers and purchasers (Munir et al., 2020; Oduoza, 2020). This interconnectedness has exposed firms to a wide array of global economic movements (Gatzert & Martin, 2015), whilst the evolution towards larger organizational structures and enhanced operational complexity has created multifaceted risk profiles wherein each risk exposure is not isolated but interconnected. Within this context, traditional silo-based risk management approaches have proven inadequate in addressing the holistic nature of contemporary business risks (Beasley et al., 2005; Wong et al., 2021). Consequently, there has been growing interest in Enterprise Risk Management (ERM) as a more comprehensive approach to managing organizational uncertainties (Lechner & Gatzert, 2018; Saeidi et al., 2021). ERM emphasizes managing risks from a holistic perspective, wherein firms examine risks jointly and assess the interaction of each risk with the organization's portfolio of other important risks (Grace et al., 2015). The implementation of a holistic ERM system typically requires the appointment of a Chief Risk Officer (CRO), establishment of risk committees, development of risk cultures across the organization, and extended stakeholder engagement efforts (Bohnert et al., 2019). Through effective management of emerging risks, ERM enhances an organization's ability to navigate uncertainties and achieve its objective, thereby helping firms to allocate resources based on the firm's risk profile and risk appetite to achieve optimal trade-offs between risk and return (Shah et al., 2025; Zou et al., 2019).

The theoretical foundation for ERM's value creation can be traced to Modigliani and Miller (1958) proposition that in perfect capital markets, firm value is irrelevant to its capital structure, and consequently, risk management does not create value. However, in the presence of real-world imperfections, capital structure becomes relevant (Harris & Raviv, 1991), and risk management does create value (Grace et al., 2015; Soltanizadeh et al., 2016). Nocco and Stulz (2006) emphasized that the organizational benefits of risk management create value for firms. Building upon the resource-based view (RBV), ERM practices are conceptualized as a firm's capability to use its resources effectively to gain a competitive advantage and improve firm performance by reducing losses (Ali et al.,

2022). Lundqvist and Vilhelmsson (2018) suggested that ERM should be able to create long-run competitive advantages and value through consistent and systematic measurement and management of firm risk and by ensuring proper information and incentives for business managers.

Empirical studies have confirmed the effect of ERM on various aspects of firms. For instance, enhancing firm risk management (Yun, 2023), corporate governance (Farooq et al., 2025; Glowka et al., 2021), shareholders' confidence (Neel & Xu, 2025), tax planning (Eastman et al., 2024), operational efficiency (Saeidi et al., 2024; Zou et al., 2019), and firm performance outcomes (Farrell & Gallagher, 2019; Kashif Shad & Lai, 2019; Malik et al., 2020; Resende et al., 2024; Silva et al., 2019). Empirical studies generally confirmed that ERM implementation will enhance firm performance outcomes, particularly financial performance, such as ROA (Gatzert & Martin, 2015; Kashif Shad & Lai, 2019), and ROE (Callahan & Soileau, 2017; Horvey & Ankamah, 2020). These findings indicate that a mature ERM adoption will strengthen a firm's ability to utilize its resources to generate profit.

Beyond direct financial performance, firm valuation has also been employed as a performance indicator in the ERM literature (Hoyt & Liebenberg, 2011; Iswajuni et al., 2018; Silva et al., 2019). As a forward-looking performance measure, it reflects market and shareholders' perceptions of firm governance quality and its future growth potential (Farrell & Gallagher, 2019; Iswajuni et al., 2018). Prior empirical studies have confirmed that ERM adoption will enhance firm valuation (Farrell & Gallagher, 2015; Iswajuni et al., 2018; Silva et al., 2019), suggesting that ERM implementation will boost investors' confidence in firms and be valued highly. Recognizing that financial performance and firm value capture distinct dimensions of firm performance outcomes, several studies have integrated both measures into the same framework and contexts to provide a more comprehensive assessment of ERM impact on performance (Farrell & Gallagher, 2019; Gatzert & Martin, 2015; Horvey & Ankamah, 2020), and confirmed to be positively associated with both measures.

Whilst the preceding evidence underscores the relevance of ERM across multiple performance dimensions, most existing studies have been conducted in Western contexts, with considerably limited attention to Malaysian settings. To the best of the authors' knowledge, only Chairani and Siregar (2021) have jointly examined both financial performance and firm valuation in the Malaysian context, signaling a notable gap in the existing literature. To address this gap, this study examined the influence of ERM implementation on both financial performance and firm valuation among Malaysian listed firms, whilst investigating which dimension is more substantially influenced by ERM. This is particularly timely given the heightened global economic uncertainty that has exposed emerging economies such as Malaysia to a broader spectrum of risks (Khong et al., 2025), raising the question of whether Malaysian investors would consider a firm's risk management practices when assessing firm value. Furthermore, this study examined whether ERM serves as a strategic organizational resource that strengthens competitive advantage, as theorized under the Resource-Based View (RBV), and whether this proposition remains valid within the Malaysian institutional context.

To address this objective, the study focuses on firms listed on Bursa Malaysia from 2010 to 2024, employing a comprehensive ERM index developed by Gordon et al. (2009). This index reflects the presence of an ERM function within a firm and measures the effectiveness of ERM processes regarding business strategy, operations, reporting, and compliance, based on the COSO (2004) framework (Malik et al., 2020). The paper is organized as follows. Section 2 reviews the literature and develops the research hypotheses, and Section 3 discusses the research methods, variables, and analysis techniques. Section 4 presents and discusses the empirical findings, and Section 5 provides the conclusion, implications, and limitations of the study.

2.0 Literature Review and Hypotheses Development

2.1 Theoretical Background

Enterprise Risk Management (ERM) emerged in the 1990s (Beasley et al., 2005; Liebenberg & Hoyt, 2003; Miller, 1992). Since then, multiple guidelines for

implementing holistic and enterprise-wide risk management have been developed (Lechner & Gatzert, 2018). Among these, the framework introduced by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in 2004, and revised in 2017, has become one of the most widely adopted frameworks. COSO defined ERM as follows (COSO, 2004, p. 3):

... a process, affected 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.

As conceptualized by COSO, ERM is an integrated and continuous organizational process embedded within strategy formulation and implemented across the entire enterprise (Gatzert & Martin, 2015). It requires individuals at all organizational levels to collectively identify various risks and prioritize them based on both the probability of occurrence and the potential magnitude of impact (Berry-Stölzle & Xu, 2018; Pérez-Cornejo et al., 2019). A central feature of ERM is the aggregation of major risks from all sources into a single risk portfolio, thereby embracing a holistic approach to risk management (Farrell & Gallagher, 2019). By systematically documenting organizational risks, ERM enables firms to holistically manage and address exposures in alignment with organizational objectives and risk appetite, thereby facilitating optimal trade-offs between risk and return (Zou et al., 2019). This comprehensive perspective on firm-wide risk exposure allows organizations to identify, assess, and manage risks in an integrated manner, supporting more informed and economically sound decision-making (Rehman & Anwar, 2019; Shah et al., 2025; Zou et al., 2019). Such an approach also promotes more efficient resource allocation and enhances the selection of value-creating investment opportunities, such as projects with higher net present values (Callahan & Soileau, 2017).

Moreover, by reducing exposure to non-core risks, ERM enables firms to focus on risks where they possess comparative advantages over peers that use traditional silo-based risk management approaches (Nocco & Stulz, 2006). This focus allows

organizations to undertake greater strategic business risks and more effectively capitalize on opportunities within their core business activities, thereby enhancing long-term competitive advantage (Callahan & Soileau, 2017).

According to the resource-based view (RBV), firms differ in performance due to heterogeneity in their resources, which shapes competitive advantage (Barney, 1991). Resources that are valuable, rare, inimitable, and non-substitutable (VRIN criteria) contribute to sustained competitive advantage (Bogodistov & Wohlgemuth, 2017). Effective ERM implementation enables firms to optimize their competitive advantage through holistic risk management, allowing better prioritization of risks that could impact VRIN resources and thus ensuring sustainable competitive advantage. Furthermore, ERM not only serves as a mechanism to protect VRIN resources from risk, but ERM itself can also function as a strategic resource for gaining a competitive advantage. According to Saeidi et al. (2019), an effective ERM system can serve as a strategic asset, creating competitive advantage by acting as a unique and non-tradable resource that enables firms to optimize resource allocation in a safer environment.

2.2 The Impact of Enterprise Risk Management Implementation on Financial Performance and Firm Value

Soltanizadeh et al. (2016) noted an ongoing debate regarding ERM benefits, wherein risk management appeared to have negative net present value from a frictionless capital market perspective, as investors could eliminate risk through portfolio diversification. Moreover, implementing a holistic ERM system entailed considerable cost, including the appointment of a Chief Risk Officer (CRO), establishment of board-level risk committees, development of risk culture across the organization, and extended public relations efforts (Bohnert et al., 2019). From this perspective, considering both market frictionlessness and implementation costs, ERM appeared either irrelevant to performance or negatively associated with it. However, under real-world market frictions, ERM could add value to organizations (Soltanizadeh et al., 2016). Rehman and Anwar (2019) emphasized that ERM not only helped firms manage risks effectively but also improved financial performance. ERM practices represented organizational capability to

utilize resources effectively, thereby gaining a competitive advantage and enhancing financial performance (Ali et al., 2022). Farrell and Gallagher (2019) suggested that ERM acted as an integrated mechanism through which organizations could scan the evolving landscape for emerging threats and opportunities, enabling proactive repositioning to achieve a more optimal position aligned with predetermined risk tolerance and appetite levels. Furthermore, Callahan and Soileau (2017) posited that effective ERM processes considered not only downside risks (preventable risks) but also attempted to enhance value through evaluation of business opportunities, referred to as upside risks or strategic risks. Similarly, Nocco and Stulz (2006) contended that ERM enabled firms to reduce non-core risks and focus more on strategic business risks, thereby capitalizing on opportunities in core business activities.

From a resource-based view (RBV) perspective, ERM was positively associated with financial performance. RBV considered ERM practices as organizational resources that contributed to competitive advantage, ultimately enhancing financial performance (Saeidi et al., 2019). ERM practices represented capabilities to utilize resources effectively, gaining a competitive advantage and improving financial performance through loss reduction (Ali et al., 2022). Previous empirical studies generally support this positive association. Florio and Leoni (2017) found that effective ERM was positively associated with financial performance in the Italian context, confirming that ERM helped reduce risk exposure and thereby contributed to enhanced outcomes. Similar results were also found Yun (2023) who confirmed the effect of ERM on enhancing firm risk management in the US context. Gordon et al. (2009) examined the relationship between ERM and financial performance by constructing a comprehensive ERM index based on COSO 2004 standards, confirming positive associations in the United States context. Malik et al. (2020) found positive effects of ERM on performance and highlighted the positive moderating effect of board-level risk committees in the United Kingdom context. Studies in the European Union region by Resende et al. (2024) demonstrated how ERM positively impacted performance both directly and indirectly through mediating mechanisms. Collectively, these studies suggest that ERM plays an important role in improving firm financial outcomes across different countries and industry settings.

The benefits of ERM implementation appeared to extend beyond financial performance to encompass non-financial dimensions as well. Saeidi et al. (2021) found that ERM enhanced both financial performance (proxied by return on assets, return on equity, and return on investment) and non-financial performance (proxied by customer satisfaction, internal business processes, innovation, and competitive advantage) amongst Iranian firms. Furthermore, Zou et al. (2019) documented that ERM implementation improved operational efficiency and mitigated costs within Chinese manufacturing firms. Studies within the Malaysian context yielded similar outcomes. Chairani and Siregar (2021) found that ERM implementation was positively associated with a firm's value and financial performance in ASEAN 5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand). Further, Kashif Shad and Lai (2019) examined the Malaysian oil and gas sector and found that ERM was positively associated with performance measured by ROA. In addition, Saeidi et al. (2024), employing questionnaire research methods, found that ERM exerted positive effects on outcomes amongst Malaysian listed companies. Shah et al. (2025) studies on Malaysian oil and gas companies found that ERM is positively associated with firms' green growth performance by influencing firms' environmental and resource productivity. Hence, the following is postulated:

H1: ERM is positively associated with firm performance.

Moreover, ERM implementation is expected to positively associate with firm value. Farrell and Gallagher (2015) emphasized that ERM attempted to create shareholder value by enabling firms to achieve more optimized risk-return trade-offs. Complementing this view, a robust ERM framework may strengthen investor confidence, as holistic risk management practices reassure investors in the security and performance of their invested capital (Chairani & Siregar, 2021), and these confidences hence reflect into firm valuation as investors demonstrate greater willingness to purchase firm share at a premium price. Furthermore, whilst establishing a robust ERM framework requires considerable resource commitment, for instance, the appointment of CRO and the formation of a risk committee, such investments are expected to generate value by reducing unnecessary risk exposure and ensuring holistic risk oversight (Bohnert et al., 2019). When the value generated exceeds the initial implementation costs, ERM begins

to enhance and generate shareholder value. This view is further corroborated by Hoyt and Liebenberg (2011), who posited that ERM acts as a source of firm value by providing more comprehensive information regarding a firm's overall risk exposure. Consistent with these theoretical arguments, empirical studies generally found positive associations between ERM implementation and firm value (Bohnert et al., 2019; Chairani & Siregar, 2021; Farrell & Gallagher, 2015; Horvey & Ankamah, 2020; Hoyt & Liebenberg, 2011; Iswajuni et al., 2018; Silva et al., 2019). Therefore, the following is hypothesized:

H2: ERM is positively associated with firm value.

3.0 Methodology

3.1 Data and Sample

This study examined the impact of Enterprise Risk Management (ERM) on firm performance amongst non-financial firms listed on Bursa Malaysia. The observation period spanned from 2010 to 2024. The study started in 2010 to maximize the length of the observation window and to mitigate the residual effects of the 2008 global financial crisis. All data were sourced from the Standard & Poor's Capital IQ database (S&P Capital IQ), which provides standardized and reliable financial data for publicly listed companies. To mitigate the influence of extreme values and potential outliers that could distort empirical results, all continuous variables were winsorized at the 5th and 95th percentiles. Following these data screening and winsorization procedures, the final sample comprised 11,285 firm-year observations.

3.2 Measurement Variables

3.2.1 Enterprise Risk Management Index (ERMI)

To quantify the extent of ERM implementation at the firm level, this study constructs an Enterprise Risk Management Index (ERMI) based on a conceptual framework developed by Gordon et al. (2009). The constructs are based on four dimensions proposed by COSO

(2004), namely strategy, operation, reporting and compliance. The ERMI is calculated as the sum of standardized variables across these four dimensions, formulated as follows:

$$ERMI = \sum_{k=1}^2 Strategy_k + \sum_{k=1}^2 Operation_k + \sum_{k=1}^2 Reporting_k + \sum_{k=1}^1 Compliance_k$$

3.2.1.1 Strategy

The strategy dimension assesses a firm's capacity to achieve competitive advantage. Within an industry, firms compete for sales opportunities in the same market; therefore, superior sales performance relative to the industry average indicates strategic outperformance. This dimension is operationalized using two measures:

$$Strategy_1 = \frac{Sales_i - \mu_{Sales}}{\sigma_{Sales}}$$

where $Sales_i$ = Sales of firm i in 2010, μ_{Sales} = average industry sales in 2010, and σ_{Sales} = standard deviation of sales of all firms in the same industry.

$$Strategy_2 = \frac{\Delta\beta_i - \mu_{\Delta\beta}}{\sigma_{\Delta\beta}}$$

where $\Delta\beta_i = -(\beta_i \text{ in 2010} - \beta_i \text{ in 2009})$, β_i = firm i 's beta, $\mu_{\Delta\beta}$ = average industry $\Delta\beta$ in current year, and $\sigma_{\Delta\beta}$ = standard deviation of $\Delta\beta$'s of all firm in the same industry.

3.2.1.2 Operations

The operations dimension evaluates the efficiency and effectiveness of a firm's resource utilization. Two variables are used as proxies for operating performance.

$$Operation_1 = \frac{Sales}{Year - End \text{ total assets}}$$

$$Operation_2 = \frac{Sales}{Total\ equity + Total\ fixed\ asset}$$

3.2.1.3 Reporting

This dimension evaluates the reliability of financial reporting. Poor financial reporting quality is posited to increase a firm's overall risk of failure, which may decrease firm value.

$$Reporting_1 = Auditor\ opinion + Restatement$$

Firms with unqualified opinions in their auditor's report have the variable Auditor Opinion set equal to -1 , otherwise it is set to 0 . The restatement of a firm's financial statements is viewed as a reduction of a firm's reporting reliability. If a firm announced a restatement in 2005, the variable Restatement is set to -1 , otherwise it is set to 0 . The range of $Reporting_1$ is therefore between -2 to 0 .

$$Reporting_2 = \frac{|Normal\ accruals|}{|Normal\ accruals| + |Abnormal\ accruals|}$$

$Reporting_2$ represents the ratio of normal accruals to total accruals. This measure captures earnings quality by estimating the extent of accrual manipulation. Higher values indicate more reliable reporting with lower levels of manipulation. Normal accruals are estimated using the Modified Jones Model (Jones, 1991; Dechow et al., 1995).

$$\frac{TA_{ijt}}{A_{ijt-1}} = \alpha_{jt} \left(\frac{1}{A_{ijt-1}} \right) + \beta_{1ijt} \left(\frac{\Delta REV_{ijt} - \Delta REC_{ijt}}{A_{ijt-1}} \right) + \beta_{2ijt} \left(\frac{PPE_{ijt}}{A_{ijt-1}} \right) + \varepsilon_{ijt}$$

Where TA_{ijt} denotes total accruals, A_{ijt-1} is prior year total assets, ΔREV_{ijt} is the change in revenue, ΔREC_{ijt} is the change in receivables, and PPE_{ijt} represents gross property, plant, and equipment for firm i in industry j , and ε_{ijt} = error term for firm i in industry j . Total accruals are defined as income before extraordinary items minus

operating cash flows (Gordon et al., 2009). Finally, abnormal accruals are calculated as the difference between total accruals and the estimated normal accruals.

3.2.1.4 Compliance

The compliance dimension reflects the firm's adherence to applicable laws and regulations. Improved compliance is expected to reduce the risk of failure and enhance performance.

$$Compliance = \frac{Settlement\ net\ gain\ (loss)}{Total\ assets}$$

This variable serves as a proxy for compliance risk and is calculated as the net gain or loss from legal settlements scaled by total assets.

3.2.2 Dependent and Control Variables Construct

Table 1 summarizes the variable constructs used in this study. Firm performance is proxied by return on assets (ROA), while firm value is proxied by Tobin's Q (TOBINQ). Tobin's Q is utilized as a measure of firm value, capturing the firm's value from the shareholder perspective and reflecting future shareholder expectations (Gatzert & Martin, 2015; Hoyt & Liebenberg, 2011). Additionally, firm size (FS), leverage (LEV), and asset tangibility (TANG) are included as control variables to account for differences in company characteristics that may affect firm performance.

Table 1: Variables Construct

Variables	Abbreviation	Descriptions	Adapted from
Return on asset	ROA	Net income divided by total assets	Chairani and Siregar (2021)
Tobin's Q	TOBINQ	The sum of the market value of equity and total liabilities divided by total assets	Chairani and Siregar (2021)
Firm size	FS	The natural logarithm of total assets	Czerwinka and Jaworski (2021)

Variables	Abbreviation	Descriptions	Adapted from
Leverage	LEV	Total debt divided by total assets	Czerwonka and Jaworski (2021)
Asset tangibility	TANG	Tangible assets divided by total assets	Czerwonka and Jaworski (2021)

3.3 Regression Models and Method

To examine the relationship between Enterprise Risk Management (ERM), firm performance, and firm value, this study employed a static panel data regression analysis using the fixed effect (FE) method introduced by Mundlak (1978). The fixed effect approach controls for unobserved firm-specific heterogeneity and time-invariant characteristics that could confound the relationship between ERM and firm performance. Two separate models were estimated to evaluate the effect of ERM on firm performance outcomes. Specifically, model 1 examines the impact of ERM on ROA, addressing H1, while model 2 assesses the impact of ERM on TOBINQ, addressing H2. Firm size (FS), leverage (LEV), and asset tangibility (TANG) were included as control variables in all specifications, as these characteristics have been identified in prior literature as important determinants of firm performance. All regression analyses were conducted using R statistical software. The general empirical specification is as follows:

$$ROA_{it} = \beta_0 + \beta_1 ERM_{it} + \beta_2 Size_{it} + \beta_3 LEV_{it} + \beta_4 TANG_{it} + \eta_i + \delta_t + \varepsilon_{it} \quad (1)$$

$$TOBINQ_{it} = \beta_0 + \beta_1 ERM_{it} + \beta_2 Size_{it} + \beta_3 LEV_{it} + \beta_4 TANG_{it} + \eta_i + \delta_t + \varepsilon_{it} \quad (2)$$

4.0 Results and Discussion

4.1 Descriptive Analysis

Table 2 presents the descriptive statistics for the key variables examined in this study. Return on asset (*ROA*) exhibited substantial variability across the sample, with a standard deviation of 4.94 and values ranging from -6.31% to 14.28%, suggesting considerable

heterogeneity in firm profitability. The mean *ROA* of 3.29 exceeded the median of 2.84, indicating a right-skewed distribution with some firms achieving notably higher returns. Tobin's *Q* (*TOBINQ*) demonstrated a mean of 1.27 (*SD* = 1.15), with the first quartile (*Q1* = 0.69) below 1, suggesting that a significant portion of firms traded below their assets replacement value. The maximum value of 8.95 revealed substantial variation in market valuation. Similarly, *ERMI* displayed high dispersion (*SD* = 2.15; *Min* = -11.42; *Max* = 8.75), with a median of 0.97 close to the mean of 1.10, reflecting diverse risk management practices across firms.

Firm leverage (*LEV*) showed relatively limited variation (*SD* = 0.15; *Min* = 0.00; *Max* = 0.96), with a mean of 0.19 and median of 0.17, indicating that most firms maintained conservative leverage ratios. Firm size (*FS*) exhibited moderate variability (*SD* = 1.41), with values concentrated between *Q1* (4.85) and *Q3* (6.89). Asset tangibility (*TANG*) displayed a mean of 0.30 (*SD* = 0.21), suggesting that firms held approximately 30% of their assets in tangible form, with interquartile range (0.13 to 0.43) indicating modest variation in asset composition across the sample. Overall, the high number of observations across all variables (ranging from 10,229 to 11,113) provided a robust dataset, and the descriptive statistics offered valuable insights into sample characteristic, which were sufficient for further empirical evaluation.

Table 2: Descriptive Statistics

	Mean	Median	St. Dev	Min	Max	Q1	Q3	Obs.
ROA	3.29	2.84	4.94	-6.31	14.28	0.39	6.19	10,825
TOBIN Q	1.27	0.90	1.15	0.10	8.95	0.69	1.34	10,554
ERMI	1.10	0.97	2.13	-11.42	8.75	-0.28	2.35	10,229
LEV	0.19	0.17	0.15	0.00	0.96	0.07	0.31	10,293
FS	5.29	5.84	1.41	3.41	8.73	4.85	6.89	11,113
TANG	0.30	0.28	0.21	0.00	0.97	0.13	0.43	11,113

4.2 Multicollinearity Checks

This study utilized Pearson correlation to examine the relationships among the dependent variables, independent variables (*ERMI*), and control variables (*LEV*, *FS*, *TANG*). The correlation results presented in Table 3 revealed that both dependent variables positively correlated with *ERMI*. Among the control variables, firm size (*FS*) exhibited positive correlations with both dependent variables, while leverage (*LEV*) and asset tangibility (*TANG*) demonstrated negative correlations. Importantly, all correlation coefficients remained below the threshold of 0.5 ($|r| < 0.5$), indicating the absence of multicollinearity concerns as suggested by Cohen (2013). Alternatively, Variance Inflation Factor (VIF) was examined (Table 4). All variables had a VIF values below 5, indicating the absence of multicollinearity issues (Hair et al., 2021).

Table 3: Pearson Correlation Matrix

	ROA	TOBINQ	ERMI	LEV	FS	TANG
ROA						
TOBINQ	.37***					
ERMI	.27***	.22***				
LEV	-.07***	-.00	.12***			
FS	.07***	.11***	.24***	.30***		
TANG	-.06***	-.01	-.05***	.14***	-.01	

Note(s): Correlation is significant at *** significance at 1%, ** significant at 5% and * significant at 10% (two-tailed)

Table 4: Variance Inflation Factor

	VIF	1/VIF
ERMI	1.0523	0.9505
LEV	1.1449	0.8734
FS	1.1425	0.8753
TANG	1.0341	0.9670

4.3 Pre-Regression Diagnostics and Model Selection

Prior to conducting the main regression analysis, several diagnostic tests were performed to ensure the validity and reliability of the model specifications. Table 5 presented the

results of various diagnostic test for both ROA and TOBINQ models. The F-test for individual effect (F_{limer}) yielded highly significant results for both ROA ($F = 12.303, p < 0.01$) and TOBINQ ($F = 9.297, p < 0.01$), indicating that the fixed effects model was more appropriate than the pooled OLS model (Baltagi, 2021). The Breusch-Pagan test (Breusch & Pagan, 1980) further confirmed the presence of individual effects, with test statistics of 10946.123 ($p < 0.01$) and 16167.428 ($p < 0.01$) for ROA and TOBINQ respectively.

To determine the choice between fixed effects and random effects models, the Hausman test was conducted. The test results were statistically significant for both models ($ROA: \chi^2 = 206.495, p < 0.01$; $TOBINQ: \chi^2 = 518.405, p < 0.01$), suggesting that the fixed effect approach was more suitable for this study (Hausman, 1978; Wooldridge, 2010). Additionally, the heteroskedasticity test (Modified Wald test) revealed significant heteroskedasticity in both model ($ROA: 1056.095, p < 0.01$; $TOBINQ: 255.300, p < 0.01$), while the Wooldridge test indicated the presence of serial correlation ($ROA: 883.863, p < 0.01$; $TOBINQ: 145.787, p < 0.01$). To address these econometric concerns, robust standard errors were employed in the fixed effect regression.

Table 5: Diagnostic Tests

Model	F_limer Statistic	Breusch and Pagan Statistic	Hausman Chi-sq. Statistic	Heterosked asticity Chi-sq. Statistic	Wooldridge _Serial Statistic
ROA	12.303***	10946.123* **	206.495***	1056.095** *	883.863***
TOBINQ	9.297***	16167.428* **	518.405***	255.300***	145.787***

Note(s): *** significance at 1%, ** significant at 5% and * significant at 10%

Table 6 presents the fixed effects regression results for both dependent variables. The models demonstrated strong explanatory power, with R^2 values of 0.601 and 0.659 for ROA and TOBINQ respectively, indicating that approximately 60% and 66% of the

variance in the dependent variables was explained by the independent and control variables. The adjusted R^2 values remained robust at 0.563 and 0.625, confirming the models' goodness of fit. The F-statistics were highly significant for both models ($ROA: F = 66.730, p < 0.01$; $TOBINQ: F = 8.268, p < 0.01$), demonstrating the overall significance of the regression models (Baltagi, 2021). Both models incorporated firm and year fixed effects to control for unobserved firm-specific characteristics and time-varying effects. The diagnostic test confirmed that fixed effects specification with robust standard errors was appropriate for addressing potential econometric issues, thereby enhancing the reliability of the subsequent empirical findings.

Table 6: Fixed Effect Regression Results

	ROA	TOBINQ
	(1)	(2)
ERMI	0.358***	0.031***
	(0.029)	(0.007)
LEV	-4.158***	-0.032
	(0.591)	(0.112)
FS	0.467***	-0.078*
	(0.172)	(0.045)
TANG	-4.444***	-0.448***
	(0.680)	(0.137)
Obs.	11099	11099
Firm effect	Yes	Yes
Year effect	Yes	Yes
Constant	4.470	1.974
R^2	0.601	0.659
R^2 Adj.	0.563	0.625
Hausman Test ($p - val$)	0.0000	0.0000
Breusch-Pagan ($p - val$)	< 0.001	< 0.001
F-Statistic	66.730***	8.278***

Note(s): *** significance at 1%, ** significant at 5% and * significant at 10%

4.4 Regression Analysis

Table 6 presents the fixed effect regression results examining the relationship between the enterprise risk management index (ERMI) and firm performance and firm value measures. The ERM index, developed based on Gordon et al. (2009), served as the

independent variable in this study. The results revealed that ERMI exhibited positive and statistically significant associations with both ROA ($\beta = 0.356, p < 0.01$) and TOBINQ ($\beta = 0.031, p < 0.01$), providing support for the hypothesised relationships. Among the control variables, the findings demonstrated mixed effects across the two models. LEV showed a significant negative relationship with ROA ($\beta = -4.158, p < 0.01$) but was statistically insignificant for TOBINQ ($\beta = -0.032, p > 0.10$). FS exhibited a positive association with ROA ($\beta = 0.467, p < 0.01$) whilst demonstrating a negative relationship with TOBINQ ($\beta = -0.078, p < 0.10$). TANG displayed consistent negative association across both dependent variables (ROA: $\beta = -4.444, p < 0.01$; TOBINQ: $\beta = -0.448, p < 0.01$). The subsequent subsections provided detailed discussions of these findings in relation to the research hypotheses and existing literature.

4.4.1 ERM Implementation and Firm Performance

The regression results indicated that the ERM implementation index (ERMI) was positively and significantly associated with return on assets (ROA), suggesting that a one-unit increase in ERMI corresponded to a 0.358 unit increase in ROA, holding other factors constant. This finding provides empirical support for H1, which posits that ERM implementation positively influences firm performance in the Malaysian context. These results are consistent with a broader body of empirical literature documenting positive relationships between ERM and financial performance throughout various geographical contexts (e.g., Callahan & Soileau, 2017; Florio & Leoni, 2017; Malik et al., 2020; Naseem et al., 2020; Rehman & Anwar, 2019; Resende et al., 2024; Soltanizadeh et al., 2016). Notably, the findings align with studies conducted in similar regional settings, such as Kashif Shad and Lai (2019), who examined the Malaysian oil and gas sector and found positive associations between ERM and ROA, and Chairani and Siregar (2021), who reported comparable results across ASEAN 5 countries using ROA and TOBINQ as performance proxies.

The positive relationship between ERM and firm performance can be interpreted through the resource-based view (RBV), which posits that ERM serves as an organizational resource that contributes to sustained competitive advantage (Saeidi et al.,

2019). Effective ERM implementation enables firms to develop a comprehensive risk culture (Bohnert et al., 2019), which is expected to generate sustained advantages as firms maintain sound risk management practices. Furthermore, Eckles et al. (2014) argue that ERM implementation enhances firm profitability by providing reliable risk management frameworks and adequate risk policies, both of which play instrumental roles in improving financial performance. Yun (2023) further confirms that ERM enhances firms' risk management capabilities, leading to improved operational outcomes.

The mechanism by which ERM influences performance can also be understood through the lens of strategic risk management. Callahan and Soileau (2017) and Nocco and Stulz (2006) suggest that effective ERM enables firms to adopt a holistic view of their risk profiles, allowing them to focus on upside risks and strategic business opportunities rather than solely mitigating downside risks. This strategic orientation facilitates the identification and capitalization of opportunities that might otherwise go unnoticed, thereby improving performance outcomes. In summary, these findings provide solid evidence supporting H1, indicating that ERM implementation is positively associated with firm performance in Malaysian listed companies.

4.4.2 ERM Implementation and Firm Value

Regression analysis indicated that the ERM Implementation Index (ERMI) exhibited a positive and statistically significant relationship with Tobin's Q, suggesting that enhanced ERM implementation corresponded with higher firm valuations. This result provides empirical support for H2, which hypothesized a positive association between ERM implementation and firm value. The findings align with previous empirical studies documenting positive relationships between ERM and market-based performance measures (Farrell & Gallagher, 2015, 2019; Gatzert & Martin, 2015; Hong, 2023; Hoyt & Liebenberg, 2011; Iswajuni et al., 2018; Silva et al., 2019). Notably, Gatzert and Martin (2015) examined both firm value (measured by Tobin's Q) and firm performance (measured by ROA), reporting positive associations with ERM implementation. Similarly, Hoyt and Liebenberg (2011) and Horvey and Ankamah (2020) documented positive relationships between ERM and both firm-level performance measures (ROA

and ROE) as well as market-level indicators (Tobin's Q). The latter study, focusing on the Ghanaian context, offers insights from an emerging market comparable to Malaysia.

The positive association between ERM and firm value likely reflects market participants' recognition of the strategic benefits provided by comprehensive risk management practices. Tobin's Q, as a forward-looking measure, captures market expectations regarding future performance and reflects shareholders' assessments of firm worth beyond book value (Gatzert & Martin, 2015; Hoyt & Liebenberg, 2011). This relationship suggests that effective ERM implementation enhances shareholder confidence in the security and performance of invested capital (Chairani & Siregar, 2021). This interpretation aligns with the view that robust ERM facilitates more optimized risk-return trade-offs (Farrell & Gallagher, 2015). By enabling firms to systematically identify, assess, and manage risks while capitalizing on strategic opportunities, ERM contributes to shareholder value via improved resource deployment and strategic management. Although the fixed effects (FE) model indicates that ERM positively influences firm value ($\beta = 0.031$), the magnitude of this effect remains comparatively modest relative to its influence on financial performance ($\beta = 0.358$). This pattern is consistent with findings by Horvey and Ankamah (2020) in the Ghanaian context. These results suggest that, while ERM implementation is recognized by investors in their asset valuation decisions within Malaysia, it does not yet serve as a primary driver of firm valuation. This may indicate that Malaysian investors prioritize direct financial outcomes over risk-management sophistication when assessing firm value.

However, these outcomes contrast with those of Otero González et al. (2020), who reported that ERM adoption was not significantly associated with firm performance measures, including ROA, ROE, and Tobin's Q, in the Spanish context. This variation may be attributed to institutional differences, regulatory environments, or varying ERM maturity levels across geographical contexts. Nevertheless, the majority of empirical evidence, including the present study, suggests that ERM implementation generally contributes positively to firm value in emerging markets. In conclusion, the results provide substantial support for H2, demonstrating that ERM implementation is positively associated with firm value among Malaysian listed companies and reinforcing the

strategic significance of comprehensive risk management in boosting market perceptions and shareholder confidence.

5.0 Conclusion and Future Research

This study investigated the impact of enterprise risk management (ERM) implementation on firm-level financial performance and market-level firm value among Malaysian listed companies from 2010 to 2024. The empirical findings provided strong support for both research hypotheses. The results indicated that ERM implementation was positively and significantly associated with return on assets ($\beta = 0.358, p < 0.01$), demonstrating that enhanced ERM practices contributed toward improved financial performance at the firm level. In addition, ERM showed a positive relationship with Tobin's Q ($\beta = 0.031, p < 0.01$), suggesting that comprehensive risk management practices improved market perceptions and increased shareholder confidence in firm value. While previous studies have predominantly examined financial performance in isolation, the joint analysis of both financial performance and firm value in this study provides insightful findings and advances understanding of ERM's broader organizational benefits. The findings indicate that ERM implementation benefits firms not only by mitigating operational risk through a holistic risk management approach, but also by strengthening market perception and investor confidence. These results are broadly consistent with earlier studies investigating ERM's impact across both performance dimensions (Farrell & Gallagher, 2019; Gatzert & Martin, 2015; Horvey & Ankamah, 2020).

Overall, although ERM shows a stronger association with financial performance, its relatively modest influence on firm value suggests that ERM implementation is primarily aimed at improving current financial outcomes. The weak association with Tobin's Q ($\beta = 0.031, p < 0.01$) indicates that, while ERM is acknowledged by investors in their valuation decisions, it is not a primary factor influencing how investors evaluate and value firms. Nevertheless, the influence of ERM on firm valuation remains important, particularly in the Malaysian context, where corporate governance is gaining prominence. The introduction of corporate governance ratings for Bursa Malaysia-listed companies reflects an increasing regulatory emphasis on governance quality and

transparency. Therefore, when firms consider ERM adoption, the consequences for market confidence and firm value should be weighed alongside direct financial performance benefits during strategic planning.

From a theoretical perspective, the findings reinforce the resource-based view (RBV) proposition that ERM practices constitute organizational capabilities that contribute to long-term competitive advantage (Saeidi et al., 2019). By enabling firms to adopt holistic perspectives on risk profiles and assisting optimal risk-return trade-offs (Zou et al., 2019), ERM functions as a strategic resource that enhances both internal operational outcomes and external market valuations. The results support the argument that ERM represents valuable, rare, and inimitable organizational capabilities that improve firm performance through effective resource utilization (Ali et al., 2022; Bogodistov & Wohlgemuth, 2017). Furthermore, this study adds to the growing body of ERM literature by providing evidence from the Malaysian context. As the findings align with earlier studies conducted in other contexts (Farrell & Gallagher, 2019; Gatzert & Martin, 2015; Horvey & Ankamah, 2020), the generalizability of ERM's function in enhancing firm financial performance and firm value is reinforced, indicating that its influence extends throughout diverse institutional and regulatory environments. Despite these contributions, several limitations should be acknowledged. First, the study used single measures of firm-level performance (ROA) and market-level value (Tobin's Q), which, although widely accepted, may not capture the full range of performance dimensions. Second, the analysis treated all Malaysian listed companies as a homogeneous sample, without accounting for industry-specific differences. As Oyewo (2022) noted, ERM practices are contextual, indicating that ERM's impact may vary across industries with different risk profiles and operational characteristics. Consequently, the findings may not be uniformly applicable across all sectors or geographical region.

Subsequent research could address these limitations by using alternative performance measures, such as return on equity or operating performance measures, to provide more thorough insights. Additionally, industry-specific analyses would improve understanding of how ERM effectiveness varies across sectors with distinct risk environments and regulatory systems, thereby helping to more nuanced understanding of

ERM's value proposition in different organizational contexts. Furthermore, given that ERM shows a stronger association with financial performance than with firm value, firm value may not be directly influenced by ERM but rather by mediating mechanisms. Subsequent studies might investigate potential mediating pathways, such as corporate governance quality or ESG performance, through which ERM implementation may indirectly enhance firm value, thereby providing a more subtle understanding of how ERM implications translate into firm market-level performance.

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