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The Effect of the Enterprise Risk Management Quality on Firm Risks: A case of the South African Mining Sector

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Abstract

The process of risk management is constantly shifting towards a more holistic and comprehensive approach, the Enterprise Risk Management (ERM) system, which is arguably more efficient than the conventional approach, the Traditional Risks Management (TRM) system. While there have been attempts to evaluate the effects of ERM on a firm's performance and value, there is limited evidence on the effect of implementing ERM on a firm's overall risk.

This article examines if ERM is successful in mitigating a firm's risks and if ERM is more effective than TRM. The study commenced its selection process with 29 mining companies that were listed on the Johannesburg Stock Exchange (JSE) for at least one year between 2004 and 2015. The study used annual data gathered from Bloomberg Database and McGregor's BFA Database employed the Fixed Effects Model (FEM) to arrive at its findings. The study found that ERM quality is successful in mitigating firm risks while TRM was found to improve the level of risks faced by companies. The findings obtained by this study suggest that ERM is more effective and efficient in mitigating firm risks than TRM.

Keywords: *ERM Quality, Firm Risks, FEM*

Introduction

Mining companies face a wide range of risks. Among the most significant risks faced by mining companies are operational failures as well as commodity price and foreign exchange rate volatility (Ernst & Young, 2016). In the context of South Africa, there are increasing political risks which can largely be associated with industrial actions and government outcomes. The 2014 platinum mines five months industrial action over a wage increase resulted to a ZAR 24.1 billion loss in total revenue and reduced the country's GDP by 1.3 per cent (South African History Online, 2014). How effective mining companies are in managing their risks is not only essential for their sustainability but also for the sustainability of the South African economy.

Ariff *et al.* (2014) describe risk management as a process, culture and structures that are directed towards the realisation of a firm's potential opportunities whilst minimising any opposing effects. Consistent with this, Ping and Muthuveloo (2015) alludes to the fact that risk management is a process of identifying significant risks, finding consistent, comprehensible and viable risk measures, choosing the most appropriate risk response and establishing procedures to monitor and review the process. Stated alternatively, risk management is a process initiated by firms to inhibit any uncertainties resulting from business activities with an intent to realise a firm's set objectives (Purdy, 2010).
Corporate risk management has shifted from a silo-based approach known as the TRM system, to a more holistic and comprehensive approach, the ERM system. The TRM system can be described as a

compartmentalised and uncoordinated approach to risk management that allowed firms to manage risks in isolation (Shad and Lai, 2015). Shad and Lai (2015) found that TRM fails to provide an opportunity for firms to view risks at a corporate level and that it was this deficiency that gave rise to ERM. Contrary to TRM, ERM aggregates all risks into a portfolio, and thereby only hedges against the residual risk, which is viewed as more efficient than managing each risk independently.

Recently, corporate leaders are relatively more concerned about the level of risks undertaken by their organisations. Business organisations are increasingly adopting more advanced risk management tools to assist firms in keeping their risks within the optimal range. This has drastically increased the use of ERM within firms, with mining companies being no exception (Bromiley *et al.*, 2015). Despite this, the uncertainty, contradictory findings and lack of empirical evidence on ERM remains a matter of concern for most managers.

While numerous studies have evaluated the effects of ERM on performance and value, these studies often fail to demonstrate the consequences of implementing ERM on a firm's overall risks (Beasley et al., 2005, Gordon et al., 2009, Pagach and Warr, 2011). This study evaluated the effect of ERM quality on firm risks on JSE-listed mining companies. In addition, the study examined whether ERM was successful in mitigating firm risks and if ERM was more effective than TRM in mitigating firm risks. To arrive at its findings, the study used the FEM and found that ERM was effective as well as more efficient in mitigating firm risks than TRM.

Literature review

ERM is defined as a process, effected by the board of directors, managers and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity and manage risks to be within its risk appetite, to provide reasonable assurance regarding the achievement of the entity's objective (COSO, 2004). The fundamental objective of ERM is not to reduce a firm's total risks *per se*, but to assist companies identify all sources of risks within the company, to enable decision-makers to align decision-making across the firm to the strategic and operational objectives of the company and to help companies keep their risk levels within a firm's risk profile (COSO, 2004). Notwithstanding, several studies proposed that one of the

essential benefits of implementing ERM is improved firm performance and value which is realised through the reduction of a firm's overall risks (Beasley *et al.*, 2008, Baxter *et al.*, 2013).

In addition to the above, Aabo *et al.* (2005) hold that the ERM framework provides firms with a long-term competitive advantage which increase firm value by mitigating the possibilities of lower-tail outcomes. Beasley *et al.* (2008) define lower-tail outcomes as a probability that substantial losses in earnings could have dire consequences for the firm. Nocco and Stulz (2006) add that firms greatly exposed to these lower-tail outcomes stand to benefit substantially from the implementation of ERM, while the implementation of ERM by firms that are not greatly exposed to these risks could possibly diminish the value of the firm. In addition, Beasley *et al.* (2008) further claim that the implementation of ERM reduces idiosyncratic risks as well as risk premium and ultimately the cost of capital.

Baxter *et al.* (2013) argued that if higher levels of ERM are effective in reducing the likelihood and impact of negative financial events, firms would be able to substantially reduce their direct and indirect costs associated with business failure, bankruptcy and reputational effects, which ultimately reduces a firm's total risk. This study by Baxter *et al.* (2013) found that risker firms are associated with lower levels of ERM quality. The study explained further that riskier firms that demand higher levels of ERM sometimes lack the capital resources and personal expertise required to implement higher levels of ERM and this, negatively affecting firm value. Ahmed and Abdul Manab (2016) recommends further that business organisations should deploy more resources on ERM programmes to achieve an efficient ERM.

To the contrary, a study by McShane *et al.* (2011) found that, while enhancing the quality of TRM increased firm value, there was no realisation of such value found by changing from TRM to ERM, or by enhancing the quality of ERM. These findings by McShane *et al.* (2011) are contradictory to the assertions of several authors who argued that the ERM is superior to the conventional methods of managing risks, TRM. Prior to this, Hoyt *et al.* (2008) showed that while TRM might be successful in reducing the probability of catastrophic losses, there are potential interdependencies between risks that might not be identifiable with the traditional approach. Hoyt *et al.* (2008) claimed that the integration of risk management activities by the ERM provides firms

with facilities to identify such interdependencies, which ultimately enhance the risk management process.

McShane *et al.* (2011) also found that systematic risks positively correlate with ERM, while cash flow volatility was found to be negatively correlated to ERM. The results further revealed that systematic risks and cash flow volatility are both negatively and significantly related to firm value. These results suggest that, at a given level of ERM, an increase in a firm's risks will destroy the value of the firm, and that the implementation of ERM will increase the market-related risks and reduce cash flow volatility.

Bartram *et al.* (2011) propose that firm risks can be better estimated by stock price variation, as an aggregated measure of relevant information. Eckles *et al.* (2014) also validated this, adding that stock prices are considerably more reliable since these are recorded more frequently as opposed to other common measures, such as cash flow and earnings. A study by Eckles *et al.* (2014) finds that firms that adopt ERM experience a reduction in risks and increased earnings post implementation. Baxter *et al.* (2013) explain that the implementation of higher ERM quality can affect the perceptions of market participants and thereby stock price returns and accounting earnings.

Research methodology

Data

Data used in this study was gathered from Bloomberg's database and McGregor's BFA database. Considering that corporate organisations are not obligated to disclose whether they are engaging in ERM activities, a thorough investigation of the company's Integrated Annual Reports, risk management policy and risk management framework of sampled companies was conducted.

The study then applied key phrases to assess whether ERM was being implemented. The key phrases used include "Enterprise Risk Management", "Enterprise-wide Risk Management", "Comprehensive Risk Management", "Integrated Risk Management" and "Strategic Risk Management". These phrases were chosen since they are viewed as synonymous with ERM (Hoyt and Liebenberg, 2011, Eckles *et al.*, 2014). Immediately after one of these phrases was identified, an intense investigation followed to verify whether ERM was being implemented.

While the ERM Integrated Framework was only introduced in 2004, academic research on an integrated approach to risk management existed years before its official introduction (D'Arcy and Brogan, 2001, Liebenberg and Hoyt, 2003, COSO, 2004). This study measured the quality of ERM using an ERM index that was developed by Gordon *et al.* (2009) who quantified the ERM quality based on a firm's ability to achieve four objectives of ERM as set out by COSO (2004). Resultantly, this study limited its data collection to an 11-year period commencing from 2004.

The research population for the study was defined as all companies that listed on the JSE for at least one year between 2004 and 2015. The study focused on JSE-listed companies since data of these companies is widely available and easily accessible. In order to exercise research control for the sectoral and regulatory differences, the study focused mainly on the mining companies. This was largely because the South African mining sector has, for decades, been the basis of the South African economy (source) and how best these companies can effectively and efficiently manage their risks is a key factor for the South African economy. To further accommodate any survival bias, the study included both active and delisted companies as part of its sample.

The study commenced its sample selection process with 29 active and delisted mining companies that were listed on the JSE between 2004 and 2015. The study then selected 22 companies that were listed for at least 6 years within the given time-frame. From these companies, 19 companies with full data available for at least 6 years were then selected. The risk management system implemented by all 19 companies was assessed and a final selection was made for sampling. The study concluded its sample selection with 15 companies that implemented ERM for at least 4 years between 2004 and 2015. The final panel dataset comprised 165 firm–year observations.

Model specification

The study models the effect of ERM quality on firm risks using FEM. The FEM was used based on the assumption that mining companies are distinct from one another in ways that cannot be measured entirely or quantified completely. The study further assumed that these differences are correlated with certain explanatory variables included in the regression model. FEM accounts for the heterogeneity effects by

estimating a constant mean for each company which is fixed over time (Gujarati, 2009).

In addition to the above, the study assumed that in the absence of ERM, firms implement TRM. The study also assumed that the objectives of the TRM and ERM do not differ significantly. It is their approach to risk management that differs. Consequently, the study used the ERM Index to quantify both the quality of ERM and the quality of TRM for the years in which the ERM was not implemented. The study included an ERM implementation dummy variable to provide an indication of the years in which the ERM was being implemented. This approach of using the ERM quality proxy as a measure of both the ERM and TRM is similar to an approach used by McShane *et al.* (2011) who categorised the ERM ratings by Standard and Poor (S&P) to a TRM and ERM realm.

To model the effect of ERM quality on firm risk variations, the study set the standard deviation of the daily stock price return against the general proxy of risk management quality and ERM quality. This model is expressed as follows:

$$FirRis_{it} = \beta_1 ERMI_{it} + \beta_2 ERMI_{it} * ERM\_IMP_{it} + \beta_3 X_{it} + C_i + u_{it}$$

Where FirRis is the stock price volatility, ERMI is the ERM index, ERM_IMP is the ERM implementation dummy variable, X is the vector of the controlled variables, C_i is the constant term and u_{it} is the stochastic error term.

The study examined the coefficient β_1 and β_2 to evaluate the impact of risk management quality on total risk and ultimately the ERM quality on firm risk variations. A significantly negative β_1 suggest that high-risk management quality reduces the level of risks within a firm while a significantly positive one indicate that high-risk management quality increases the level of risks faced by firms (Brooks, 2014). A significantly positive β_2 indicate that a firm's high ERM quality increases the level of risks faced by firms while a significantly negative β_2 suggest that the implementation of ERM is successful in mitigating a firm's total risks (Brooks, 2014). The study hypothesised a negative coefficient β1 and β2 as the study anticipated that higher levels of TRM and ERM reduces the level of risks faced by companies.

Similar to studies by Bartram *et al.* (2011) and Farrell and Gallagher (2015), the study measured total risk by standard deviation of the daily stock price returns. The study then used the Enterprise Risk Management Index (ERMI) developed by Gordon *et al.* (2009) to quality

the level of risk management implementation and a dummy variable to indicate ERM implementation.

Gordon *et al.* (2009) quantified the level of ERM implemented based on a firm's ability to achieve four ERM objectives set by the *ERM Integrated Framework*. *ERM Framework* by COSO (2004)stipulate that a firm's ERM should be geared towards the realisation of the strategy, operation, reporting and compliance objectives.

Gordon et al. (2009)In context of the above, ERMI was measured as follow:

$$ERMI_{it} = \sum_{k=1}^{2} StI_{it} + \sum_{k=1}^{2} OpI_{it} + \sum_{k=1}^{2} Rel_{it} + \sum_{k=1}^{2} CoI_{it}$$

Where ERMI is a firm's ERM Index, StI is the strategy objective indicator, OpI is the operation objective indicator, ReI in the reporting objective indicator and CoI is the compliance objective indicator.
The four objectives are measured as follows:

1. Strategy objective

The first strategy indicator (StI1) was measured as a ratio of total sales less the average sales within the industry (MSale) to the standard deviation of sales for all firms within the industry (σMSales), whereas the second strategy indicator (StI2) was measured as ratio of changes in stock market beta (Δβ) less an industry's average change beta (MΔβ) to the standard deviation of changes in the beta of all firms in the same industry (σMΔβ).

$$= \frac{Sales_{it} - MSale_{it}}{\sigma\, MSales_{it}} \qquad StI2_{it} = \frac{\Delta\beta_{it} - M\,\Delta\beta_{it}}{\sigma M \Delta\beta_{it}}$$

The study used the sum of all selected companies as a proxy of the industry. To this effect, the industry's average sale and average beta were derived as an average value of the final selection sample. The study further used the all-share index as a proxy for the market portfolio (Bhandari, 1988, McShane *et al.*, 2011).

2. Operation objective

The first operational indicator (OpI1) was measured as ratio of total sales to total assets, while the second operational indicator (Opl2) was measured as a ratio of total sales to total firm's number of employees.

$$OpI1_{it} = \frac{Sales_{it}}{Total\ Assets_{it}} \qquad OpI2_{it} = \frac{Sales_{it}}{No.\ of\ Employees_{it}}$$

3. Reporting objective

The first reporting indicator (ReI1) was measured as a sum of material weakness, auditor opinion and restatement. Material weakness took a value of -1 when there are any material weaknesses disclosed, or otherwise zero, whereas audit opinion took a value of -1 when a firm receives a qualified opinion or zero when it receives an unqualified report and restatement took a value of -1 when there are any restatements reported or zero otherwise.

$$ReI1_{it} = Material\ Weakness_{it} + Audit\ Opinion_{it} + Restatement_{it}$$

The second reporting indicator (ReI2) was measured as the proportions of the absolute value of normal accruals divided by the absolute value of the sum of normal and abnormal accruals(Gordon et al., 2009). ReI2 can be expressed as follows:

$$ReI2_{it} = \frac{|Normal\ Accruals_{it}|}{|Normal\ Accruals_{it}| + |Abnormal\ Accruals_{it}|}$$

Whereas:

$$|Total\ Accruals_{it}| = NPAT_{it} - CFFO_{it}$$

$$|Nomal\ Accruals_{it}| = |Total\ Accruals_{it}| - |Abnormal\ Accruals_{it}|$$

$$\frac{TA_{it}}{A_{i,t-1}} = \alpha_t \left[\frac{1}{A_{i,t-1}}\right] + \beta_1 \left[\frac{\Delta REV_{it}}{A_{i,t-1}}\right] + \beta_2 \left[\frac{PPE_{it}}{A_{i,t-1}}\right] + u_{it}$$

Where TA represents total accrual, A represents total assets, ΔREV represents the change in revenue, PPE represents property, plant and equipment, NPAT represents net profit after tax, and CFFO represents cash flows from Operations.

Gordon *et al.* (2009) estimated the abnormal accruals using an accrual estimation model derived from Jones (1991). Total accruals were estimated as earnings less operating cash flow, while the normal accruals were estimated as the difference between total and abnormal accruals.

Abnormal accruals were estimated as the error term of the total accruals, deflated by the total asset of the previous period.

4. Compliance index

The first compliance objective indicator (CoI1) was measured as a ratio of auditors' fee to total assets, while the second compliance objective indicator (CoI2) was measured as a ratio of settlement net gains or losses to total assets.

$$CoI1_{it} = \frac{Auditor's\ Fees_{it}}{Total\ Asset_{it}}$$

$$CoI2_{it} = \frac{Settlement\ Net\ Gains\ (Loss)_{it}}{Total\ Assets_{it}}$$

Consistent with the findings from previous studies on a firm's risk variations, the study takes account of firm size, director ownership and profitability in firm total risks (Beatty and Zajac, 1990, Miller *et al.*, 2002). Table 1 provides a brief description of the proxy and the expected relationships between a firm's value and each controlled variable.

Table 1: Control Variables

Variable	Expected Relationship	Proxy
Firm Size	Positive	Natural Log of Sales
Director Ownership	Negative	Per centage of Stock Held by Directors
Profitability	Positive	Return on Assets (ROA)

Diagnostic tests

The study also tested for statistical weaknesses which, if not treated, could lead to biased estimates. The dataset comprised of twelve time-dimensional and fifteen cross-sectional units which means that the cross-sectional component is more dominant than the time-series component. Resultantly, the study limited the diagnostic tests to tests for Cross-

Sectional Dependence (CSD) and multicollinearity. This study tested for multicollinearity using the Variance Inflation Factors (VIF), and when this was detected, the study dropped the affected variables.
CSD in panel data can arise for several reasons, such as not accounting for economic, political or technological global shocks or unobserved 'local' shocks affecting only a subset of cross-sectional units (Demetrescu and Homm, 2016). It is expected that firms within the similar industries would be influenced by the same market shocks which would result in error terms of firms moving in the same direction. When dictated, the study used the Driscoll – Kraay Estimators to account for CSD.

Findings

Descriptive statistics

The table below provides the descriptive statistics analysis for the dependent and explanatory variables used by the study. The 165 firm-year observations were made in relation to 15 selected companies over a 12-year period. The firm's overall risks were measured by an annual standard deviation (SD) of daily stock price returns. The descriptive statistics analysis indicated that, on average, the daily stock price of firms moved around the mean by 3.12 per cent.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm Risk	165	0.0312	0.0137	0.0147	0.1093
Risk Management	165	2.1088	2.0982	-4.1914	8.7171
ERM Quality	165	1.4525	2.0663	-2.4097	8.7171
Director Ownership	165	6.2584	13.0186	0	51.13
Firm Size	165	9.3129	1.8257	4.0225	11.6334
Profitability	165	0.0502	0.2223	-0.8111	1.4236

The descriptive statistics analysis further indicated that mining companies realised, on average, an annual profit of 5.02per cent on their assets, as measured by the ROA ratio. It is worth noting that the average returns on assets substantially exceeded firm risk, as measured by the

average value of the standard deviation of daily stock price returns, 3.12 per cent.

The descriptive statistics reported a positive index on both the general risk management quality and ERM quality proxies. Both values were measured by a firm's ability to meet the four objectives of ERM as set by COSO with exception that the general risk management proxy measured the risk management quality for the years in which ERM was not implemented. Both average values indicate that the mining companies were successful in meeting some of these objectives.

Correlation matrix

The correlation table below provides the correlation coefficients for variables used by the study. The correlation coefficient between the dependent variables and most independent variables follow the expected sign, except for Director Ownership. The correlation coefficient between the level of firm risks and ownership of board members was statistically insignificant.

The correlation coefficient between a firm's risk and risk management proxies suggest that higher risk firms are more likely to implement higher risk management quality programmes. These results were consistent with the expectations of this study. The correlation coefficient between firm risks and the quality of ERM was statistically insignificant.

Table 3: Correlation Matrix

	FirRis	**ERMI**	**ERMI_IMP**	**DirOwn**	**FS**	**Prof**
FirRis	1.0000					
ERMI	0.3034*	1.0000				
ERMI_IMP	0.0732	0.7636***	1.0000			
DirOwn	0.0586	-0.0633	0.0257	1.0000		
FS	0.3683***	0.4285***	0.4323***	0.0726	1.0000	
Prof	0.0698	-0.0160	-0.0067	0.0796	-0.0009	1.0000

Please note, this table provides the Pearson correlation coefficients for the variables.

, ** and * denote level of significance at 10 per cent, 5 per cent and 1 per cent, respectively.*

The correlation matrix further demonstrates that larger companies are more likely to implement higher risk management quality. The correlation Matrix showed a positive and significant correlation coefficient between firm size and both TRM quality and ERM quality proxies. This association can be justified further by a positive correlation coefficient between firm size and firm risks in that larger companies face more firm risks, and, as a result, are more likely to implement high quality risk management programmes.

In the above context, the correlation coefficient between ERM quality and firm size was found to be higher than the correlation coefficient between TRM and firm size. This seek to indicate that larger companies are relatively more likely to implement ERM than TRM.

Preliminary results

This study used FEM to estimate the effect of ERM on firm risk variations. Prior to its main analysis, the study tested for the presence of multicollinearity and CSD using the variance inflation factor (VIF) test and the Pesaran's CSD test, respectively. Consistent with O'brien (2007), this study used the coefficient of 10 and above, as a standard to indicate excessive levels of multicollinearity. As demonstrated in the table below, the study failed to detect any problem of multicollinearity.

Table 4: VIF Test

Variable	**VIF**	**1/VIF**
Risk Management	5.08	0.1969
ERM Quality	3.61	0.2771
Firm Size	2.75	0.3634
Director Ownership	1.27	0.7859
Profitability	1.06	0.9464
Mean VIF	2.75	

The study then proceeded to test for CSD using the Pesaran's CSD test.

Table 5: Pesaran's CSD Test

Pesaran's test of cross sectional independence =	1.140,	Pr = 0.2542
Average absolute value of the off-diagonal elements =	0.289	

The Pesaran's CSD test found no presence of CSD since it failed to reject the null hypothesis at all conventional levels of significance. In addition, the absolute value of correlation was found to be low at 0.289, which serves as a confirmation that there was no CSD present. These results suggested that the disturbance terms were independent and uncorrelated with cross-sectional units.

Regression analysis

Table 7 presents the empirical findings of the effect of ERM on a firm's risks. This study employed FEM to establish the effectiveness of ERM in mitigating firm risks and its efficiency over TRM. FEM was selected based on its ability to control unobserved heterogeneity. The first column presents the coefficients which indicate the direction and magnitude to which each variable was related to firm risks. The second column provides the standard error, whilst the last column provides the t–statistic.

Table 6: Regression Model

Variable	**Coefficient**		**Standard error**	***t*-statistic**
Risk Management	2.840475	*	1.509063	1.88
ERM Quality	-4.164249	***	1.455525	-2.86
Firm Size	3.026818		3.32455	0.91
Director Ownership	0.3696839		0.3497243	1.06
Profitability	7.299886		9.140136	0.80
R-square	**0.1763**		**Prob > F**	**0.0703**

*Please note: *, ** and *** denote significance at 10 per cent, 5 per cent and 1 per cent, respectively.*

The regression model found a positive relationship between firm risks and TRM, at 10 per cent level of significance and a negative relationship between firm risks and the quality of ERM implemented, at 1 per cent levels of significance. The study reported an insignificant relationship between firm risks and all other control variables included in the model.

This study found that TRM is positively related to a firm's risks, ultimately suggesting that the silo approach is unsuccessful in mitigating total firm risks, as the study demonstrated that the TRM increases the level of risks within a company. The quality of ERM implemented was found to be negatively related to overall firm risks which suggest that the ERM programme is more effective and efficient in mitigating firm risks as opposed to TRM.

These results support the findings made by previous studies that found a negative relationship between firm risks and ERM quality (Baxter et al., 2013, Eckles et al., 2014). A study by Baxter et al. (2013) found the level of risks faced by companies to be negatively associated with ERM quality, while Eckles et al. (2014) found a that firms that adopt ERM experience a reduction in risks post the implementation of ERM. These findings by Eckles et al. (2014) are consistent with findings presented by the study, that ERM is more effective and efficient in mitigating risks than TRM. These findings were consistent with the expectations of the study which hypothesised that ERM is superior to TRM in mitigating a firm's risks.

Robustness check

The study proceeded to check for the robustness of the dependent variable. The standard deviation of Net Profit was used as an alternative variable to the SD of daily price return. Table 8 presents the findings obtained using the alternative proxy. The findings differed slightly from the findings obtained from the initial firm risks regression model. The study found that none of the explanatory variable were related significantly to the standard deviation of earning.

Table 7: Robustness Test

Variable	Coefficient	Standard error	*t*-statistic
Risk Management	-0.1137462	1.91698	-0.06
ERM Quality	-0.0723639	1.84897	-0.04
Firm Size	-2.10074	4.223214	-0.50
Director Ownership	0.0236153	0.4442588	0.05
Profitability	9.56422	11.61082	0.82
R-square	**0.0082**	**Prob > F**	**0.4210**

The goodness of fit for the initial model substantially exceeded the goodness of fit for the latter model and the P value of the *F*-test of the latter model was found to be statistically insignificant, meaning that these variables were jointly insignificant. The study confirmed the SD of daily stock price returns to be robust.

Conclusion

The purpose of this study was to establish whether higher ERM quality are successful in mitigating a firm's risk, and whether ERM is superior to the conventional method, TRM. The results obtained from FEM indicate that higher levels of ERM are successful in mitigating firm risks, while higher quality levels of TRM enhances the level of risks faced by companies. The study thus concludes that ERM is substantially more effective and efficient in mitigating firm overall risks compared to TRM.

The overall implications of these findings are that a firm whose risk management objectives include the mitigation of a firm's overall risks, should consider implementing or improving the quality of ERM, which is regarded as more effective and efficient in mitigating a firm's overall risk compared to the conventional method, TRM.

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