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Enterprise Risk Management and Performance of Johannesburg Stock Exchange Companies: Does Size Really Matter?

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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF COMMERCE, LAW AND MANAGEMENT

SCHOOL OF BUSINESS SCIENCES

ENTERPRISE RISK MANAGEMENT AND PERFORMANCE OF JOHANNESBURG STOCK EXCHANGE COMPANIES: DOES SIZE REALLY MATTER?

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ABSTRACT

This investigation aims to assess the influence Enterprise Risk Management (ERM) has on the performance of financial and non-financial organisations on the Johannesburg Stock Exchange (JSE) as well as the moderating role of firm size on the relationship. This research considers 100 listed companies which consists of 50 financial and 50 non-financial companies on the JSE. The generalised method of moments is used to test the link between ERM and performance of financial and non-financial organisations on the JSE and to test the moderating role of firm size on the ERM-firm performance relationship. ERM was measured using nine risk management features and firm size was analysed using the lagged total assets of each firm. ROA and ROE were the basis of measure for firm performance. The study revealed a positive relationship exists between ERM and firm performance for financial and non-financial firms. The results are consistent with the two performance indicators. In addition, the results reveal firm size positively and significantly moderated the ERM-performance relationship. This suggests that large firms mostly to adopt ERM due to economies of scale and may have enough resources to make certain of the effective implementation of ERM system, thereby enhancing their performance.

DECLARATION

I declare that this study, Enterprise Risk Management and Performance of Johannesburg Stock Exchange Companies: Does Size Really Matter, is my original work and sources have been cited and indicated by means of reference.

I have not previously submitted this degree for examination at any University.

Nana Sakyibea Boadu

Student: 2492067



Nana Sakyibea Boadu

…… ……

DEDICATION

To my father (Alexander Boadu), mother (Benedicta Boadu),
sisters (Akosua, Annie, Barbara and Alexis) and in-law (Percival).

ACKNOWLEDGEMENT

A special thanks goes to God Almighty for how far He has brought me. He has been the source of my strength and comfort throughout this journey. My sincere gratitude to my parents, Mr and Mrs Boadu. To my sister, thank you for your love and for being my morale booster throughout this journey.

Thank you to my supervisors, Dr Sylvester Horvey and Dr Albert Mushai for your comments and directions throughout my research work, your assistance is greatly treasured.

Finally, I want to thank Professor Thomas Dorson for his guidance and encouragement throughout my research journey.

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KEYWORDS

General Terms	
ERM	Enterprise Risk Management
CRO	Chief Risk Officer
RC	Risk Committee
JSE	Johannesburg Stock Exchange
ROA	Return on Assets
ROE	Return on Equity
ERMi	Enterprise Risk Management Index
GMM	Generalised Method of Moments
FP	Firm Performance

CHAPTER 1

1.1 Introduction

Enterprise Risk Management (ERM) has become an essential discipline in modern business practices. As businesses attempt to navigate an increasingly complicated and uncertain business environment, scholars, practitioners, and policymakers have paid close attention to ERM and its potential impact on performance (Florio & Leoni, 2017). Moreover, the advent of corporate scandals, global pandemics and economic crises have raised the importance of ERM implementation among business organisations (Beasley et al., 2005). These corporate scandals have pushed businesses to move from traditional (silo) risk management (TRM) processes to the enterprise risk management process, as it has changed businesses overall processes over time. This is due to the limitations of the TRM. Shad and Lai (2015) describe TRM as a compartmentalised and uncoordinated risk management approach that allows firms to manage risk in isolation or individual departments. This approach adopts a reactive approach to risk management using a bottom-up approach with risk oversight issues (Horvey & Odei-Mensah, 2023).

Additionally, Hoyt and Liebenberg (2011) highlight that the TRM system causes incompetencies owing to a lack of coordination between various risk management functions, and some risk activities can go unnoticed as it is difficult to assess an organisation's financial strength and overall risk profile. As a result, ERM was initiated to overcome the limitations of the TRM system. Enterprise risk management allows risk integration to drive risk management practices because of its inter-relations among risks and its highlight of risk prioritisation (Altuntas et al., 2011). It also involves a top-down approach to risk management (Bohnert et al., 2019). In a dynamic and uncertain business world, businesses may strengthen their resilience, safeguard their reputation, and generate sustainable value by integrating risk management into their strategic decision-making processes. According to Dickinson (2001), risk management traces back to the 1940s with two stands on risk management practice which is now integrated into ERM. ERM is defined as a constant, proactive, and structured process used to understand, manage, and communicate risk in an organisation-wide perspective (Berg, 2010). The Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2004) defines ERM as:

"A process, effected by an entity's board of directors, management and other personnel, applied in a 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".

According to the COSO (2020), an organisation's ERM framework through its corporate governance, culture, strategy, and objective-setting strategies should contain the organisations documented ERM policies. ERM systems help firms align their organisation's strategic decisions to achieve their goals and objectives (Marc et al., 2018). Effective risk management techniques can improve several aspects of business performance. According to Altuntas et al. (2011), the presence of ERM is a way companies measure, understand and control risks they face as it is viewed as a management tool because it helps recognise profitable ways to increase shareholder wealth. Hence, organisations may systematically assess risks, make informed decisions, and optimise resource allocation by implementing a solid ERM framework (Lechner & Gatzert, 2018). The possibility of unfavourable events and their consequent impact on financial performance, operational effectiveness, and market position is decreased by proactive risk management, which enables businesses to foresee possible threats and respond accordingly (Horvey & Ankamah, 2020). Businesses are affected by its internal and external environment. A business's operational risk forms part on its internal environment and the business's market risks and credit risk forms part of its external environment (Dickinson, 2001). Effective risk management allow organisations to manage its internal and external risk which reduces business cost and leads to the achievement of firm performance in the long-term.

1.2 Background of Study

Altuntas et al. (2011; 414) further explains that "ERM looks at the holistic view of risk management and attempts to reduce the probability of large negative earnings and cash flows by coordinating, controlling, and offsetting risks across the enterprise". An organisation's ERM framework procedure is proficient in risk integration because of its inter-relations among risks and the focus on risk prioritisation. Dickinson (2001) explains the significance of an enterprise risk framework as a system that helps organisations stay resilient by allowing it to manage the organisations external and internal factors for corporate objectives to be achieved. According to Berg (2010; 81), "Organisations are faced with many different types of risk like operational risk, project risk, financial risk, human resources risk, technological risk, health risk, safety

risk and political risk". Most of these risks are interrelated, therefore, demand a coordinated and systematic approach to managing risk. This situation is not different for firms on the Johannesburg Stock Exchange (JSE) as they are faced with a variety of risks, such as stock price volatility, earnings volatility, operational risk, and strategic risk. Therefore, companies listed on the JSE must adopt a robust ERM framework to manage these adversities.

Businesses are faced with various risks, and this is one of shareholder's biggest problems likewise the risk borne when dealing with managers of their business. Schneider and Scherer (2015) investigated the control mechanism shareholders put in place to reduce the risk that exists between them and company managers through corporate governance. Engelbrecht (2009) explains corporate governance as the appropriate standards of conduct in the form of practices, codes, and guidelines used by directors to legally perform their duties and responsibilities. Corporate Governance looks at governance within an organisation and seeks to address the agency problem that exists between shareholders and agents in organisations (Rossouw et al., 2002). Corporate governance causes effective leadership and sustainability in organisations as it sets rules and regulations for people within the organisation to adhere to. Maruhun et al. (2018) discusses the importance of corporate governance helping management regulate risk management in organisations.

The JSE, based on its ERM Philosophy has made listed companies successfully implement King III to regulate risk in the organisation. "King III Reporting has played an important role in organisations as businesses are made to report annually in an integrated manner while looking at a) how the company has, both positively and negatively, impacted the economic life of the community in which it operated during the year under review and b) how the company intends to enhance those positive aspects and eradicate the negative aspects in the year ahead" (Gstraunthaler, 2010; 148). According to Armstrong (1995) "the King Report was established under guidance from the Institute of Directors in Southern Africa with institutions like the Johannesburg Stock Exchange, South African Chamber of Business, the South African Institute of Chartered Accountants, the South African Institute of Business Ethics and the Institute of Chartered Secretaries and Administrators in South Africa in support of this reporting structure." The King report has change over time from King I, King II to King III and now King IV has been introduced to companies and is visible in their annual financial reports from 2017. Esser and Delport (2018), explains the reasons for the evolvement of the King Report from King III to King IV to improve on companies 'ethical culture, good performance, effective control and legitimacy. All JSE listed firms are governed by the King Code (Armstrong, 1995).

The JSE is a good context for this study because listed companies are required to maintain effective, efficient, and transparent systems of financial, risk management, and internal control, which includes ERM. Further, the JSE is the largest stock exchange in Africa, with a market capitalisation of about $1.356 trillion (Martin, 2023). This has seen much interest from foreign investors interested in a strong risk management system to manage their investments for higher returns. In addition, some of the companies listed on JSE have a strong international presence. Since the use of an ERM framework is largely accepted and promoted in the developed world, these companies are more likely to adopt ERM to compete with other companies in the developed world. The COSO framework captures key concepts fundamental to how organisations manage risk by providing a basis for application across all organisations, industries, and sectors. It focuses directly on the objectives and achievements of a particular entity and provides a basis for defining enterprise risk management effectiveness (Alijoyo & Norimarna, 2021). Firms on the JSE are mandated to have an ERM framework per the JSE's regulations, which is why the JSE poses a great place for ERM data to be collected. Furthermore, the JSE strengthened its ERM policies after it was affected by reputational risk in 2012. This encouraged the establishment of better risk-reporting structures to drive ERM into organisational practices in 2013.

The presence of ERM policies and corporate governance in an organisation is a good indicator of firm performance. Investors are drawn to organisations on the JSE because they have policies in place, and address risk. Investors prefer to invest when firm value is high, and the continuous effort by the JSE to maintain this establishes investor confidence. Companies operating on the JSE are required to adopt a robust risk management mechanism and can handle any risk adversities. Against this backdrop, this study seeks to explore the impact of ERM on the performance of JSE companies in South Africa. This study further examines whether the ERM-performance relationship is contingent on the firm size of JSE companies.

1.3 Research Problem

Studies on ERM can be divided into three main strands. One strand looks at the determinants of ERM adoption (Daud, Yazid and Hussin, 2009; Golshan and Rasid, 2012; Idris and Abdullah, 2016; Altuntas, Berry-Stölzle and Hoyt, 2020). Another strand considers ERM operating mechanisms (Beasley, Clune and Hermanson, 2005; Purdy, 2010; Airmic and Irm,

2010; Altuntas, Berry-Stölzle and Hoyt, 2011) and the third strand focuses on the performance implication of ERM (Florio and Leoni, 2017; Callahan and Soileau, 2017; Kurdi, Fareed Naji and Nawar Naseef, 2019; Malik, Zaman and Buckby, 2020; Horvey, and Ankamah, 2020). Previous studies on the relationship between ERM and performance have produced mixed results, highlighting the need for more research and analysis. Although some studies suggest a positive relationship between ERM and performance (Florio & Leoni, 2017; Silva et al., 2019), others suggest an inverse relationship (Pagach and Warr, 2010; McShane et al., 2011; Nguyen and Vo, 2020). Other scholars have also suggested non-linearities in this relationship, arguing that a high level of ERM implementation enhances firm performance (Horvey & Ankamah, 2020).

The differences in the empirical findings may be due to the diversities in organisational context and ERM measurement. Silva et al. (2019) argue that the generalisation of empirical findings may not be appropriate due to differences in the organisational and regulatory context; hence, the need for further investigation on this issue, particularly from an emerging market perspective. In addition, Gordon et al. (2009) further submit that the ERM-performance relationship is complex and multifaceted and the success of ERM is contingent on several factors. Therefore, there is a need to investigate how these factors moderate the relationship between ERM and performance. Some scholars have explored the moderating role of intellectual capacity and risk committees on the ERM-performance relationship (Saeidi et al., 2021; Malik et al., 2020). However, the possible interactive effect of firm size remains incipient in the literature. Nguyen and Vo (2020) suggest that as firms grow, they are exposed to diverse kinds of risk and are more likely to implement ERM.

Additionally, large firms have more financial resources to fund ERM implementation (Muslih and Marbun, 2020; Nguyen and Vo, 2020). In addition, Sari, Pratama and Yuyetta (2022) explain that the larger a company, the higher the amount of risk the company faces; hence, are more likely to implement an ERM system to manage any cost of financial distress. In addition, large firms have enough financial resources to manage the costs associated with ERM implementation (Nguyen & Vo, 2020). Smaller firms may not experience the same effect due to their size. Notwithstanding, scholars are yet to validate this assertion empirically and therefore prevent the provision of misguided policy recommendations. This research seeks to contribute to the literature through the contingency theory by exploring how size moderates the relationship between ERM and performance of firms on the JSE. Also, the contingent role of firm size on the ERM-performance relationship can be tested on the JSE listed companies as firms of different age and size are listed. The study further conducts a comparative analysis

of how ERM affects the financial and non-financial listed firm on JSE. This contributes to literature as most scholars focus on financial firms with less focus on the non-financial firms. In this regard, the study helps to identify whether ERM has an impact on both financial and non-financial firms on the JSE.

1.4 Research Purpose

The main purpose of this research is to examine the impact of enterprise risk management on the firm performance of financial and non-financial organisations on the Johannesburg Stock Exchange and how this relationship is contingent on firm size.

1.5 Research Objectives

To achieve the primary objective, the following objectives must be considered.

1. To determine the impact of ERM on the performance of financial and non-financial organisations on JSE

2. To determine the moderating role of firm size on the relationship between ERM and firm performance of financial and non-financial organisations on JSE.

1.6 Research Questions

1. What is the impact of ERM on the performance of financial and non-financial organisations on the JSE?
2. How does firm size moderate the relationship between ERM and firm performance of financial and non-financial organisations on the JSE?

1.7 Delimitation of the Study

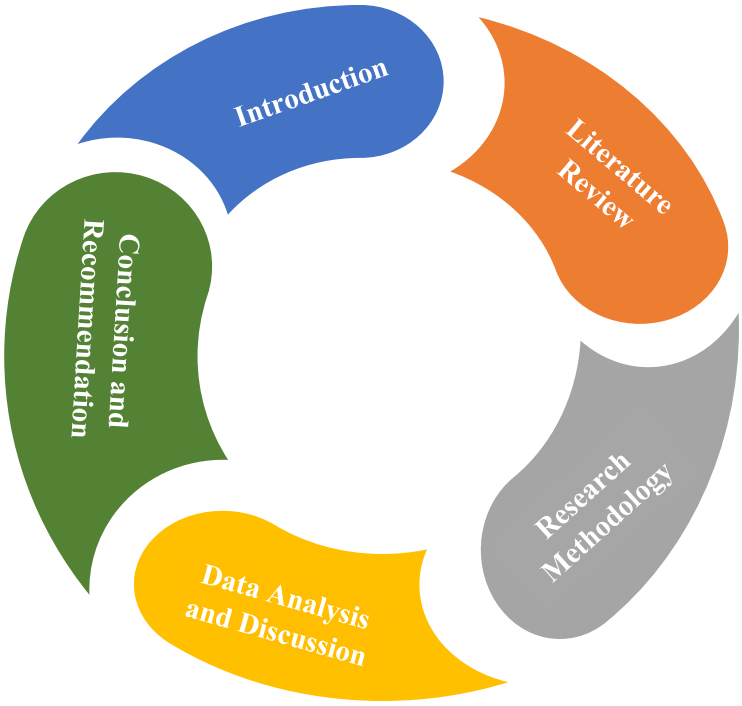
This research focuses on the firms listed on the Johannesburg Stock Exchange. Financial and non-financial firms will be analysed, as previous literature throws more light on financial firms

and less on non-financial firms. The JSE gives access to firms from different industries and, in this regard, will assist in quality research, as data will be from multiple industries. This research is delimited to the JSE, and only firms listed on it will be analysed.

1.8 Significance of the Study

This research intends to improve the literature on enterprise risk management by testing firm size and exploring whether firm size has an interactive effect on ERM in affecting performance. The JSE has in its regulations risk management philosophies and processes that organisations must follow. Corporate governance is also tested in the process as the ERM measures show the presence of corporate governance in an organisation. This research studies the effectiveness of JSE companies' ERM philosophies and eventually finds out if they cause firm performance(FP). In the long run, the study's results contribute to the improvement of risk management processes in JSE companies. In addition, this research tests ERM on a comprehensive index basis and contributes to ERM research on emerging markets as previous studies are mainly focused on developed markets like Canada, the USA, the UK and Europe. A test on the South African market will lead to improved findings on ERM.

1.9 Structure of the Study



Chapter 2: Literature Review

Academic literature on the research theory, all the association of ERM and FP and other factors that affect the relationship.

Chapter 3: Research Methodology

Methodological approach to the ERM-performance relationship, testing the contingent factor firm size. A test on the research objective and explaining the test variables being looked at.

Chapter 4: Data Analysis and Discussion

The statistical analysis on the data gathered on the ERM-performance relationship and research findings.

Chapter 5: Conclusion and Recommendation

The research conclusion and recommendations after the data has been run and analysed.

CHAPTER 2

2 Literature Review

2.1 Theoretical Review

There are several theories that govern Enterprise Risk Management (ERM) in organisations. This research looks at three of these theories, the agency theory, the corporate risk management theory, and the contingency theory of ERM. These theories help explain the different ways firm performance is achieved through enterprise risk management. Corporate governance plays a key role in organisations achieving ERM.

2.1.1 Agency and Profit Maximization Theory

The first theory to be discussed is agency theory. Agency relationships are generally more sophisticated and unclear from the perspective the agent is required to serve the interests of the principal than contractual relations, mostly when it comes to the question of ethics (Zogning, 2017; 2). A relationship exists between shareholders as the principal and managers as the agent. Although management act as an agent to maximise shareholder value, they may be more inclined to put their own interests first, which could be harmful to shareholders (Jensen & Meckling, 1976). The disparity in the preferences of the principal (shareholders) and agents (managers) gives rise to the agency problem. Different rewards, goals, and job completion discretion contribute to the agency dilemma. Instead of operating in a way that promotes the interests of the principal, agents may be inclined to operate in a way that benefits them individually. For instance, the principals are interested in high returns, and as a result, will go for high risk. However, agents prefer low risk which leads to low returns. Due to this, agents exert less effort than necessary from the fear of being answerable to the consequences from high-risk ventures.

Zogning (2017) further explains that it is impossible for shareholders to make sure managers make the best decisions on their behalf, and therefore both the shareholder and the manager will have to take up monitoring and obligation costs. Monitoring cost is borne by the principal, while's obligation cost is borne by the agent. The agency relationship is further proven through the profit maximization theory as business owners would always want to

maximize profit. According to Kamrad et al. (2021), shareholders set profit margins which cause managers to maximize business sales in order to earn bonus payouts. This leads to an increase in business equity and share value and leaves both parties, the principal and agent happy.

ERM is essential here, as it helps in minimising divided loyalty and lowering the risk of agency costs in the setting of the agency problem. ERM offers a comprehensive approach to all the risks that a business faces, including agency issues. ERM may assist in ensuring that decision-making processes are aligned in favour of the principal (shareholders) rather than favouring agents (management) by recognising agency risks and potential conflicts of interest at various levels of the organisation. ERM places strong emphasis on openness in risk management procedures. All parties, including shareholders, can access risk plans of action thanks to ERM, which guarantees a transparent and open decision-making process.

2.1.2 Theory of Corporate Risk Management

The next theory underpinning this research is the corporate risk management theory. According to Clifford and Smith (1995; 21) "corporate risk management focuses primarily on the use of derivatives such as forwards, futures, swaps, and options in hedging corporate exposures to interest rates, foreign exchange rates, and commodity prices". This benefits organisations with systematic risk management programs and causes a significant diminish in the costs of risk management products. Further analysis is made by Danisman and Demirel (2019), who measure firm value through financial hedging, operational hedging, and ERM as a means of corporate hedging which is used by organisations as it brings benefits through measuring the firm's cash flow volatility, decreasing the costs of financial discomfort, enlarging the debt capacity and its associated tax advantages, as well as decreasing tax payments and improving investment capacity of the firm increasing its firm value.

McShane et al. (2011; 644) submit that the foundational concept of ERM is in the grouping of risks into portfolios and hedging the residual of the risks. ERM is achieved through the aggregating of risks into a portfolio because it reduces the risk volatility of firms, unlike when Clifford and Smith (1995) assert that bigger firms are likely to hedge due to having exposure to more complex risks as compared to smaller firms. This leads to ERM increasing firm value. Further research by McShane, Zhang and Cox (2012) agrees with the fact that hedging helps lower total risk by decreasing the direct and indirect expense related to company

financial distress. Placing risks in insurance and heading is a way of reducing financial distress in firms, this is a benefit of ERM.

2.1.3 Contingency Theory of ERM

The third theory is the contingency theory of ERM. This theory argues that firm performance(FP) through ERM is only possible when other factors are present (Gordon, Loeb & Tseng, 2009). Contingency theory speaks to the fact that organisations do not have to follow a fixed format in mitigating risk. Ghofar (2015) explains contingency theory as the determinant of the effectiveness of a firm. Mikes and Kaplan (2014) support this theory further by stating that specific circumstances in an organisation should be the guide in picking the right risk management system for achieving performance. According to Gordon et al. (2009), "five factors affecting a firm are (1) environmental uncertainty, (2) industry competition, (3) firm complexity, (4) firm size, and (5) board of directors' monitoring". These are responsible for firm performance through ERM. Findings prove the link between ERM, and FP is dependent upon the proper match between ERM and these five contingent factors. The size of a firm is crucial in the effective utilisation of ERM as emphasised by Hossein Nezhad Nedaei et al. (2015) as larger firms have greater access to resources to invest in the implementation of an effective ERM system. Furthermore, Rujiin and Sukirman (2020) also discuss firm size as a contributing factor to managing the transparency of an organisation as larger organisations need to implement an ERM framework to help manage its institutional affairs with larger organisations facing more diverse types of risk and an effect ERM system assisting in bringing transparency into the organisation. Firm size helps in elevating the organisation's value to its stakeholders by running an effective ERM framework to achieve business goals. This theory supports the link between firm size and the ERM-performance relationship.

2.2 The Risk Management Process

ERM frameworks assist organisations to achieve business strategies through corporate governance. The presence of corporate governance shows how effective a business's ERM system is, as it allows organisational structure, risk strategizing and proper resource allocation whiles integrating ERM practices in the organisation (Horvey & Odei-Mensah, 2024). Lechner and Gatzert (2018) further examines the importance of ERM systems and associates it to the

selection of the right ERM system, the size of an organisation as the larger the organisation is the more complex the risk is, and these affects the implementation of the ERM system. The size of an organisation will determine the resources available to assist in managing its risk exposures. It is important for business processes to be controlled well through corporate governance as this helps organisations obtain its strategic goals whereas the ERM framework must be in place and aligned with corporate governance to manage the company's operation through the management team and the Board (Rossouw et at., 2002). Risk management is key in every organisation because as organisations change so do the risks that affect it. According to Cormican (2014), strategies must be aligned to manage the risk that affects organisations and the strategic level organisations must decide what to do with the risk it faces. In dealing with risk, businesses decide to accept risk, avoid risk, monitor risk, transfer risk or to the mitigate risk (Cormican (2014; 403). McShane et al. (2011) emphasis on the need for a firm's governance structure to constitute the impact of risk and risk management strategies in company-wide decision-making process. Risk is managed by businesses through the below risk management process elaborated by Berg (2010) in figure 1.

Figure 1: Risk Management Process

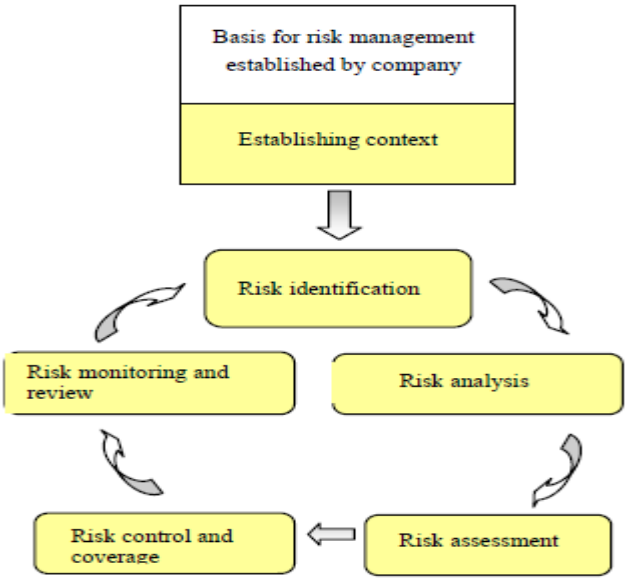


Fig.1. Berg (2010)

Further explanation on the importance of the risk management process demonstrated by Berg (2010), focuses on its ability to assist organisations identify and bring together potential risks in an organisation for strategic decisions to be made. Hoyt and Liebenberg (2011), emphasises the importance of organisations understanding their business' consolidated risk. The consolidation of an organisations risk is important because it assists the organisation to

establish the context and environment of risk faced and to set up the appropriate risk assessment process (Thao et al., 2014). Using the information gained from the consolidation of risk, risk is further broken down into risk exposures (Young ,2020). Risk identification further describes the risk identified. Risk analysis is the next step in the risk management process where risk causes and sources risk is delt with, where the consequence of risk is analysed using qualitative and quantitative methods (Thao et al., 2014). According to Berg (2010), during the management process, the risk matrix is put together at the third step and after which risk evaluation takes place at the fourth step. Further assessment is performed here as a decision needs to be taken on the risk at this stage to either, mitigate, accept, avoid or transfer the risk. The organisation then puts in place control measures for the risk to be controlled in the right way (Young ,2020). Risk Monitoring and reviewing is the last stage of the risk process, where businesses monitor the risk exposures that have been retained due to tolerance and reviewing it frequently to make sure risk is within and to check if the control and handling of risk are effective (Young ,2020; 9). The organisation wide analysis of risk introduces the concept of enterprise risk management. Arena et al. (2010) explains ERM as a process of drawing a connection between risk management, objective-setting and business strategic management. The organisational structure of Enterprise Risk Management is elaborated in figure 2 by Dickinson (2001).

Figure 2: Organizational Setting of ERM

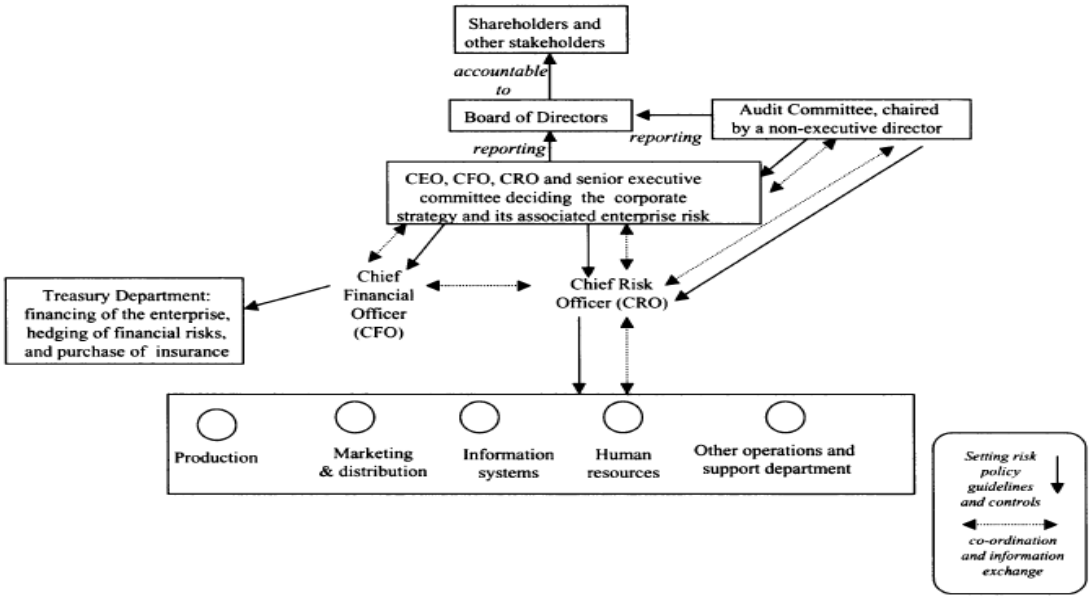


Fig. 2. Dickinson (2001)

In Enterprise Risk Management, risk management responsibility starts at the board to the operational employees of the organisation. This is what is termed the top-down approach to risk management (Bohnert et al., 2019). ERM aims at managing the different types of risk faced by the organisation (McShane, Nair and Rustambekov, 2011; 9). ERM frameworks are used to address the issues of risk governance and risk aggregation in organisations (Jankensgård, 2019). Purdy (2010) explains controls to be the after-effect of risk treatment, and whose further result improves risk. ERM Framework helps with controlling risk throughout the organisation and in the right proportions.

2.3 Enterprise Risk Management Frameworks

Enterprise Risk Management frameworks are used by firms to control risk. Different ERM frameworks have been developed to help organisations understand ERM and its implementation. An organisation's governance structure is considered when an ERM framework is being selected. Some of these ERM frameworks are the King Report, ISO, COSO, AS/NZ framework, Control Objectives for Information and Related Technologies (COBIT) ERM and the National Institute of Standards and Technology Risk Management Framework (NIST RMF). Presented below are some of the ERM frameworks, their implementations, strengths and weaknesses. Further to the above, Mupa et al. (2024), provides a list of the elements found in an ERM framework in figure 3.

Figure 3: Elements of Enterprise Risk Management Frameworks



Fig.3. Mupa, Chiganze, Mpofu and Mubvuta (2024)

2.3.1 King Report

The King Report was developed by the King committee and according to Judin, Roberts and Naidoo (2017), organisations listed on the Johannesburg Stock Exchange are mandated to comply by the King Report as the King Report is used predominantly by the JSE listed firms. The Institute of Directors South African have been involved in the risk framework's structure over the year's right from 1994 when King I was issued to 1st April 2017 when the current King IV took effect. Chauke (2019) explains the focus of good governance as a significant feature of the King IV framework. Corporate governance brings about the following four governance outcomes, "(a) ethical culture, (b) good performance, (c) effective control and (d) legitimacy" (The Institute of Directors in Southern Africa and the King Committee, 2016). The King Report is a comprehensive risk framework as it is principle based therefore making its implementation complex.

2.3.2 ISO 31000

International Organization for Standardization (ISO) 31000 (2018) risk management framework assists organisations with developing the right risk management strategy for managing risk in diverse ways. Risk can either be mitigated, avoided or risk can be transferred to another party. ISO 31000 framework is used for the application of risk management in firms (Airmic & Irm, 2010). Even though, ISO 31000 is generic in nature and supports different types of business activities, it also encourages businesses to follow a strategic process for risk management (Lalonde & Boiral, 2012). ISO 31000 is flexible proactive framework which makes it easy for organisations to adapt to its processes (Efe,2023). Figure 4 shows the steps for managing risk using the ISO 31000 (Purdy, 2010).

Figure 4: ISO 31000 Risk Management Process

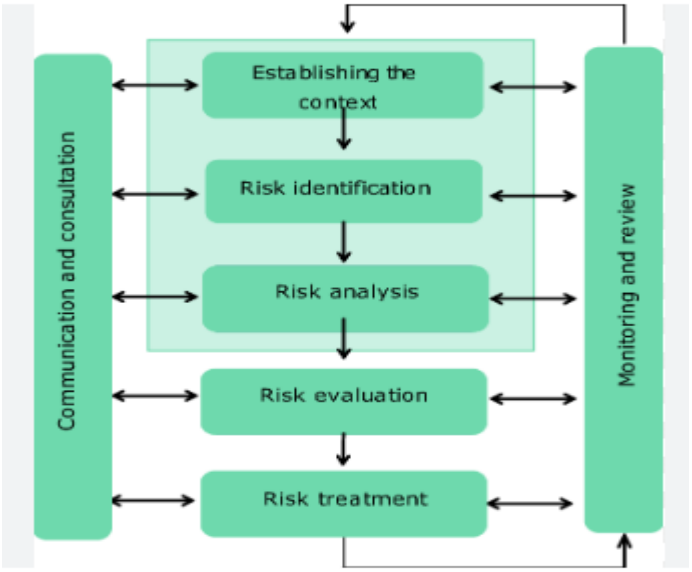


Fig.4. Purdy (2010)

2.3.3 COSO ERM Framework

The COSO framework (2013) is an ERM framework which assists organisations to attain their strategic goals. Thabit et al. (2019) discusses the importance of the COSO framework as a system that tests an organisations management of risk as it encourages organisations to drive its risk portfolio through the process of risk analysing, risk administering and matching of risk to an acceptable strategic level in the organisation. The COSO framework (2013), has five internal controls being governance and culture, strategy and objective-setting, performance, review and revision with the last section being information, communication, and reporting. The five internal controls make up the COSO ERM framework. COSO framework is noted for assisting organisations improve their internal controls and risk management procedures (Efe,2023). According to Thabit et al., 2019, Figure 5 shows the systematic flow of the COSO's ERM components where its internal control assisting in the achievement of company strategies.

Figure 5: COSO ERM Components

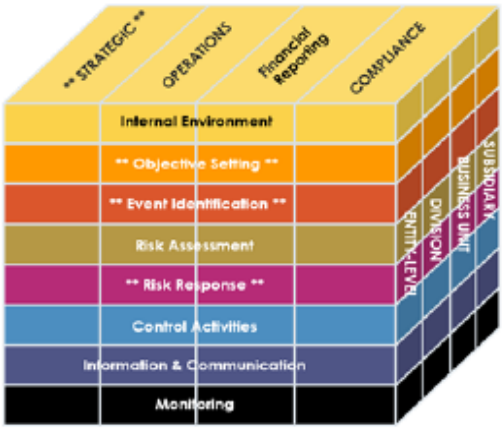


Fig.5. COSO framework (2013)

2.3.4 AS/NZ Risk Management

AS/NZ 4360:1999 risk management framework is a risk management standard that sets out the processes for dealing with risk management and assists organisation to tailor their needs except the structure is generic and lacks specificity (Cooper, 2007). According to Theodorou and Tzovenis (2023), AS/NZ 4360:1999 was later merged with ISO 31000 in 2009 to make it more efficient leading to a change in name to AS/NZS ISO 31000:2009. "AS/NZS ISO 31000:2009 is a jointly Australian and New Zealand standard prepared by the joint Technical Committee OB-007 which includes seven risk management steps which are establishing the risk context, risk identification, risk analysis, risk evaluation, risk treatment, communication & consultation and monitoring & review (Thao et al., 2014)." This assists with the holistic view of business risks. Figure 6 shows the AS/NZ 4360 risk management process explained by Cooper (2007).

Figure 6: AS/NZ 4360 Risk Management Process (1999)

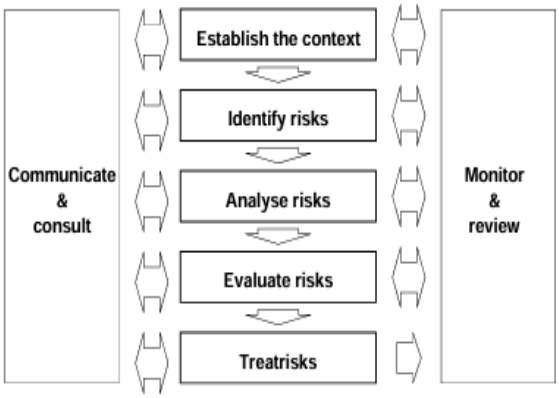


Fig.6.Cooper (2007)

2.4 Empirical Review on the Relationship between ERM and Performance

Enterprise Risk Management (ERM) implementation helps companies make strategic decisions that assist the organisation achieve performance (Florio & Leoni, 2017). Section 2.4 deals with various literature on ERM policies and regulations which affect firm performance as previous literature tests and explains why further discussion is being made on Enterprise Risk Management. Gordon et al. (2009) contribute to the ERM-performance literature through the discussion of contingency factors to ERM on firm performance. Gordon et al., (2009) tested five contingency factors, ‘‘1) environmental uncertainty, 2) industry competition, 3) firm complexity, 4) firm size and 5) board of directors’ monitoring’’ on firms listed on the US Security and Exchange Commission. The test looked at the contingency factors on the relationship and this resulted in a positive relationship. The article by Florio and Leoni (2017) is a good starting place for the argument that ERM contributes positively to firm performance as the researchers tested ERM by looking at ERM systems through the presence of risk management variables like the presence of Board of Directors, the presence of a Risk Officer and the presence of the Risk Committee as the ERM proxies. These ERM proxies have been proven to show the presence of ERM in an organisation. Pagach and Warr (2010) tested the ERM adoption proxy company announcement of a Chief Risk Officer appointment but found it not to contribute to firm performance(FP) and therefore disagrees with the ERM-performance relationship.

A further contribution to ERM was made by Quon et al. (2012) who tested ERM and the firm performance of non-financial firms recorded on the Standard & Poor’s Toronto Stock Exchange Composite Index. The test investigated the risk exposures, consequences and strategies of managing risk exposures due to the 2007-2008 global financial crisis. The paper analysed ERM through economic risk and market risk. Even though Florio and Leoni (2017) tested and concluded that effective ERM systems assist in reducing a business’s risk exposure, the test by Quon et al. (2012) contradicted the findings as their test proved that firm performance cannot be assessed through the level of risk exposure of firms therefore confirming the stands by Pagach and Warr. Oyewo (2022) conducted a robust test on ERM where a mixed methodology was used and, in the end, it was proven that ERM enhances long-term firm performance. Another importance of effective ERM is that it encourages investor confidence (Junaidi, & Hanggraeni, 2024).

Other studies on ERM have incorporated a more complex test of firm performance than previous studies (Hoyt and Liebenberg, 2011; Florio and Leoni, 2017; Gordon et al., 2009) where Tobin's Q was the only performance indicator used. An example of a complex test is one performed by Horvey and Ankamah (2020) where ERM and FP was tested on companies on the Ghana Equity Market using performance indicators, Return on Assets(ROA), Tobin's Q and Return on Equity(ROE). Furthermore, the ERM test was performed on financial and non-financial organisations, and it was established that a non-linear link remains with ERM, and performance of companies registered on the Ghana Equity Market. This study concurs with the study by Gordon et al. (2009) on ERM implementation but went further to test ERM through ROA and Tobin's Q. ERM was put through a more rigorous test by increasing the test period and the test still showed a positive connection with ERM implementation and FP.

Another test performed by Jawada et al. (2021). The study examined enterprise risk management and firm performance(FP) in Pakistani financial companies where debt to asset ratio was used as the proxy for firm performance with ERM implementation, Equity to Asset Ratio, Enterprise Value to Asset Value, Leverage, Return on Capital Employed and Return on Equity tested alongside and showing an essential influence on the ERM-performance relationship. Odubuasi et al. (2021) also performed the ERM test on financial organisations, banks registered on the Nigeria Stock Exchange. The test proved that ERM maximized whiles a Risk Committee exists leads to firm performance. The research only used ROE as the proxy for firm performance, but Jawada et al. (2021) used a more robust test both studies showed ERM to have an essential impact on FP.

Extensive research on ERM and firm performance was performed by Horvey and Odei-Mensah (2023), who provided an in-depth outlook on the connection between ERM and performance. Some facts were shared on the reasons for mixed findings on the topic being due to the use of different ERM proxies and different performance indicators, which meant there were inconsistencies with the process of testing from one researcher to another, and which prevented a good comparison of one test to another. Further investigation by Lim-u-sanno et al. (2024) showed firm performance being measured using average stock prices, whiles Abdulkadir (2024) used Tobin's Q to represent FP. One led to a positive effect on strategic objectives on the FP and the other did not have enough to confirm the positive influence on performance. While the preceding argument brings about mixed findings on the relevance of ERM, Alam et al. (2024) emphasis that for a business to enjoy effective ERM it must be integrated into the firm's goals and strategic initiatives.

The above premise sets-out hypothesis 1 to be tested, H1: To determine the impact of ERM on the performance of financial and non-financial organisations on JSE. The different performance variables ROA and ROE will be tested in H1.

2.5 Empirical Review on Contingency Factors to the Relationship between ERM and Performance

Enterprise Risk Management has evolved over the years as researchers agree that the direct relationship between ERM and firm performance(FP) is not just direct, but the relationship is affected by other factors. Further analysis on other factors which have a connection with the ERM-performance relationship is important to this research. Some of the contingency factors tested are the Risk Committee, top management commitment, intellectual capital dimensions, firm size corporate governance and budget control. This research seeks to further test the existing relationship between ERM and FP through firm size as the contingency factor.

Corporate governance ensures accountability, transparency and oversight of risk management in the organisation which in the long run leads to strategic firm performance (Sunaryo et al., 2025). A further look into the effect corporate governance has on the relationship between ERM and FP brings into discussion research by Horvey and Odei-Mensah (2024). After extensive research on ERM and FP in 2023, Horvey and Odei-Mensah (2024) further reanalysed the effect corporate governance has on the ERM-performance relationship which tested corporate governance through the size of the board, the board independence and the gender diversity of the board. This test proved corporate governance had a direct effect on the ERM-performance relationship.

In addition, performance measurement has proven to have a direct reaction on the relationship as it helps in assessing the progress of company's objective achievement and helps to develop the organisations strategic plans. The four most used performance measurement tools are the Economic Value Added, Balance Scorecard, Benchmarking and Total Quality Management (Rasid et al., 2012). Researchers like Malik et al. (2020) have contributed to the theoretical proposition of ERM and firm performance by looking at the contingency variable the Board Level Risk Committee (BLRC), this moderating variable was measured by the boards size, independence, number of meetings, financial expertise, gender diversity and multi-committee directorship. Further to this, a strong to weak BLRC involvement was tested and it was found that a structurally strong BLRC magnifies the effectiveness of the ERM processes.

Saeidi et al. (2021) adds to the assumption that intellectual capital dimensions affect the ERM-performance relationship through knowledge, training, technology, organisational culture and organisational trust. These intellectual capital dimensions were tested and proved to have a positive effect on the ERM-performance relationship. A further discussion on contingency factors also brings into the conversation the moderating variable organisational culture. Syrová and Špička (2022) explored how Organisational culture affected the performance of Czech SME's. Organisational culture was measured in two forms 1) through the mission dimension and 2) through consistency dimension and ERMi incorporated 14 variables which shows a robust analysis. Further to the positive results from the test on ERM and performance, the test also showed the importance of firm size in achieving organisational performance (Syrová and Špička ,2022).

The test on the contingency variables risk committee, firm size, board of directors monitoring, corporate governance variables, firm complexity, firm size and firm age are more prominent. A few studies have looked at other types of contingent variables like Board of Directors monitoring, intellectual capital, environmental uncertainty, competition in the industry and Organisational culture which are more obscure. Different contingent variables have been tested with the implementation of ERM, and FP have proved to be achieved in the long run. The above premise gives grounds to the modelling of firm size through enterprise risk management to achieve FP.

2.5.1 The Role of Firm Size on the ERM-performance Nexus

"Firm size can be measured through the organisations total sales, total assets, total employees, stockholder's equity and market value" (Shalit & Sankar, 1977; 294). This research measures firm size using total assets. The contingent variable firm size is used to test the relationship between ERM implementation and firm performance(FP). Studies have shown that firm size has a positive impact on ERM implementation and FP (Gordon, Loeb and Tseng, 2009; Ping and Muthuveloo, 2015; Hossein Nezhad Nedaei et al., 2015; Muslih and Marbun, 2020). This supports the topic of discussion on firm size, as larger firms enjoy economies of scale through the reduction of risk exposures which in turn reduces cost. Also, larger firms have more resources to invest into ERM practices, as the size of a firm increases, so does its risk exposure (Syrová & Špička ,2022).

It is important to analyse the size of a firm when implementing ERM, as the size determines the controls that need to be put in place to manage the risk exposures (Gordon et

al., 2009). Further research by Ping and Muthuveloo (2015) tested the firm's complexity through the number of business units or subsidiaries within the firm using firm size as the moderating variable. This test supports the notion that firm size has an important influence on the ERM-performance relationship as larger firms have more resources to adopt more sophisticated risk management systems which assists in the control of how much risk that the organisation faces due to its size (Hossein Nezhad Nedaei et al.,2015). The administration of ERM is decided at Board level for effective risk monitoring to be enterprise wide. The size of a firm is crucial in the effective utilisation of ERM as larger firms have greater access to resources to invest in the implementation of an effective ERM system and the size of the organisation determines how sophisticated the implemented ERM system.

Furthermore, to the discussion on firm size, Rujiin and Sukirman (2020) mentioned firm size as a contributor in managing the transparency of an organisation as larger organisations need an ERM framework to help manage its institutional affairs as larger organisations face more diverse types of risk and an effect ERM system would assist in bringing transparency into the organisation. The assessment made by Muslih and Marbun (2020) on enterprise risk management and performance through risk management, firm age and firm size of banking companies on the Indonesia Stock Exchange tested the moderating role of corporate governance. It proved to have a positive and significant effect on the performance of the banks on the Indonesia Stock Exchange. Researchers have found a significant impact of ERM contributions to the performance of the business which talks to firm size as the cause of investor confidence in a business as the larger a firm the better the ERM framework in place to manage risk and in turn leads to profitability (Maharani & Pangestuti, 2024).

Studies support the test for the moderating variable firm size in the ERM-performance relationship. Hence the above argument set-out hypothesis 2 to be tested, H2: To determine the moderating rule of firm size on the relationship between ERM and firm performance of financial and non-financial organisations on JSE.

Table 1: Empirical Literature

No.	Author (s)	Year	Objective of Study	Findings
1	Gordon, Loeb and Tseng	2009	To assess the contingency perspective of enterprise risk management on FP of firms on the US Security and Exchange Commission. A test on ERM-firm performance was carried out by finding the right match with a firms ERM system and five firm factors.	The test found a positive affiliation between ERM and performance through the existence of other factors
2	Pagach and Warr	2010	To test the effect of ERM implementation and to find out if it improves financial performance.	The test did not find a substantial increase in performance in relation to the presence of ERM.
3	Rasid, Golshan, Ismail and Ahmad	2012	Malaysian Companies were tested for risk management and organisational performance by the use of performance measurement systems.	Its test was proven to bring about organisational performance.
4	Florio and Leoni	2017	Italian Companies were tested for ERM implementation through ROA and Tobin's Q.	Firms with advanced levels of ERM implementation present higher performance.
5	McShane, Nair and Rustambekov	2011	Tested S&P's ERM rating to find out if contributes to firm value.	The test proved that firm value does not increase as firms implement ERM.
6	Quon, Zeghal and Maingot	2012	ERM was analysed through economic risk and market risk of Canadian Companies. Operational, accounting and financial market performance was examined by the sales changes, changes in EBIT margins and the Tobin's Q.	Firm performance cannot be assessed by the level of economic or market risk disclosure of firms.
7	Horvey and Ankamah	2020	A test on the Ghana Stock Exchange was performed on 3	The test found a non-linear relationship with ERM and performance.

			performance measurements which are ROA, Tobin's Q and ROE.	
8	Muslih and Marbun	2020	ERM-performance was tested with the contingent variable corporate governance.	A direct relationship exists with ERM and performance of banks on the Indonesia Stock Exchange.
9	Jawada, Nazb, Waheedc, Rizand and Shamsie	2021	ERM-performance was examined on Pakistani financial companies where performance was measured as debt to asset ratio.	The test showed ERM to have a significant effect on firm performance
10	Chairani and Siregar	2021	To test the effect of ERM on a firm's financial performance and firm value, with ESG as the moderating variable	There is a positive effect of ERM on financial performance and firm value with ESG also having a positive impact on financial performance and firm value.
11	Sari, Pratama, Raharja, Yuyetta and Widhiastuti	2022	Tested the association of the board of commissioners, the ownership concentration, the audit committee meetings and the risk management committee with ERM moderating company size.	Company size does not moderate the relationship between the ownership concentration and risk management committee against enterprise risk management.
12	Horvey and Odei-Mensah	2023	To measure the performance of enterprise risk management	It was found that ERM measurement is most common in the US and minimal in other countries. And also, a lot of different types of proxies have been used for the measurement of ERM and leading to mixed findings on firm performance.
13	Tze Yin, Ai Ping, Siti Nabiha and Sukumar	2023	The purpose of ERM on the FP of private higher education institutions in Malaysia	The test proved that ERM has a positive influence on the FP of private higher education institutions.
14	Horvey and Odei-Mensah	2024	Enterprise risk management and performance of the South African	The test showed a positive relation is present between ERM and insurers underwriting

			insurers with corporate governance as the moderating role.	performance and profitability when the moderating variable corporate governance was evaluated.
15	Lim-u-sanno, Saengchamnong, Wiroonratch and Othong	2024	To test the level of influence ERM relationships have on firm value of firms on the Thailand Stock Exchange.	The test proved a positive relation stands between firm value and 3 influence components (ROA, Size and listed company groups) and a negative relation exists between firm value and 4 other influence components (ERM, Leverage, Current ratio and COVID-19 affected years)

CHAPTER 3

3 Research Methodology

3.1 Introduction

This chapter looks at the research systematic approach which is a quantitative analysis performed on the secondary data collected from company annual financials and from the JSE. The development of the research framework assists in achieving the study's aim.

3.2 Research Design

The study adopts a quantitative approach to test the association ERM has on firm performance(FP) and the moderating role of firm size on the connection between ERM and FP. A quantitative research approach is used because the study employs secondary data to test the relationships between several variables to determine their significant influence. As explained by Saunders et al. (2009), a quantitative research approach gets its meaning derived from numbers, its test follows the method of statistical data analysis, and its results are in numerical and standardised data. Since the data collected is numerical (measured or counted numerically) and statistical, a quantitative approach is used.

3.3 Research Paradigm

There are four types of research philosophies, which are positivism, realism, interpretivism and pragmatism. Crossan (2003) explains positivism paradigm reasoning to assume an objective reality that is free of human behaviour. The results from a positivism test conducted are factual and cannot be changed and are therefore called the natural scientist (Saunders et al., 2009). A positivism paradigm, according to Park et al. (2020), is where there is a single material reality present and can be perceived, identified, measured and with which it's knowledge must be expanded objectively without the values of the researchers and the participants affecting the research objectives circumstance. This study is aligned with the positivist research paradigm due to the quantitative nature of the study, which seeks to explore the relationships among several factors.

3.4 Data Collection

Secondary data was collected from the annual financial reports of financial and non-financial companies on the Johannesburg Stock Exchange(JSE). Data collected from this source includes firm performance, firm size, firm age, firm market share, firm financial leverage and firm efficiency. Also, information on the ERM features was collected from the governance report of the listed companies.

3.5 Sample Size and Sample Period

Analysis was done on 50 financial[1] and 50 non-financial[2] organisations over a period of 9 years (2014 to 2022). 100 random companies were analysed in total out of 400 listed companies on the JSE due to data availability and lack of reporting information for the selected time period. The split into financial and no-financial firms is due to the difference in industry regulatory requirements. According to (JSE, 2016) the Johannesburg Stock Exchange required companies to have an ERM framework from 2013. 2014 is the selected start date because of the directive and using 2014 ensures every organisation analysed would have in place a risk management framework and therefore initiating the 2014 start period. Also, the JSE is the easiest place to find audited financial statements because public entities are made to publish their financials to the public. Companies were selected at random from the top JSE companies to those that are not at the top. This was to assist with the research's moderating variable, firm size in assessing its influence on an organisation's performance through the presence of ERM.

[1] "ABSA'', "African Equity Empowerment Investments Limited", "Alexander Forbes Group Holdings Limited", "Accelerate Property Fund Ltd", "Brimstone Investment Corporation", "Capitec Bank Holdings Limited", "Clientele Limited", "Coronation Fund Managers", "Delta Property Fund Limited", "Development Bank of Southern Africa", "Deneb Investments Limited", "Dipula Income Fund Limited", "Discovery", "Equites Property Fund Limited", "FirstRand Limited", "Finbond Group Limited", " Fortress REIT Limited", "Grand Parade Investments Limited", "Growthpoint Properties Limited", "Hammerson plc", "Hosken Consolidated Investments Limited", "Hyprop Investments Limited", "Investec Limited", "Investec plc", "Invicta Holdings", "MAS Real Estate Inc", "Momentum Metropolitan Holdings", "Nedbank Group Limited", "Octodec Investments Limited", "Old Mutual Limited", "OUTsurance Holdings Limited", "PSG Konsult Limited", "Purple Group Limited", "RMB Holdings Limited", "Reinet Investments S.C.A.", "Remgro Limited", "Resilient REIT Limited", "Safari Investments RSA Limited", "Sanlam Limited", "Santam Limited", "Sasfin Holdings Limited", "Sygnia Limited", "Standard Bank of South Africa", "Texton Property Fund Limited", "Transaction Capital Ltd", "Trematon Capital Investments Limited", "Vukile Property Fund Limited", "Vunani Limited", "Visual International Holdings Limited", "Zeder Investments Limited".

[2] "Adcorp Holdings Limited", "AECI Limited", "Airports Company South Africa SOC Limited", "Anglo American Platinum Limited", "Anglogold Ashanti Plc", "Aspen Pharmacare Holdings Limited", "Anglo American PLC", "Anheuser-Busch InBev", "Barloworld Limited", "Bell Equipment Limited", "Bidvest Group", "Blue Label Telecoms Ltd", "British American Tobacco PLC", "City Lodge Hotels Ltd", "Clicks Group Limited", "Delta Property Fund Limited", "DRD Gold Limited", "Exxaro Resources Limited", "Glencore PLC", "Gold Fields Limited", "Harmony Gold Mining Compny Limited", "Impala Platinum Holdings Limited", "KAP limited", "Kumba Iron Ore Limited", "Lewis Group Limited", "MC Mining Limited", "Metair Investments Limited", "Mondi PLC", "Mr Price Group Limited", "MTN Group Limited", "Murray & Roberts Holdings Limited", "Netcare Limited", "Naspers", "Northam Platinum Limited", "Oceana Group Limited", "PPC Limited", "Pick n Pay Stores Limited", "Pan African Resources plc", "Randgold & Exploration Company Limited", "Raubex Group Limited", "Sasol Limited", "Shoprite Holdings Limited", "Sappi Limited", "Super Group Limited", "Tiger Brands Limited", "Telkom SA SOC Limited", "Vodacom Group Limited", "Wesizwe Platinum Limited", "Woolworths Holdings Limited", "York Timber Holdings Limited".

3.6 Variable Descriptions

3.6.1 Dependent Variable

The study employs two performance indicators to determine how ERM-performance relationship is affected by firm size. Firm performance (FP) is being represented by ROA and ROE. ROA is calculated as the ratio of net profit to total assets. Also, with ROE the study measured it as the ratio of net profit to total equity. According to Kabajeh et al. (2012), ROA and ROE are profitability ratios and held measure operational efficiency.

3.6.1.1 Firm Performance

The study employs two performance indicators to determine how ERM-performance relationship is affected by firm size. Firm performance (FP) has been measured using ROA and ROE. ROA is measured as the ratio of net profit to total assets. Also, with ROE the study measured it as the ratio of net profit to total equity. According to Kabajeh et al. (2012), ROA and ROE are profitability ratios and held measure operational efficiency.

Return on Assets (ROA)

ROA is one of the widely used measurements for assessing firm performance. This reveals how successfully a company is using its resources to produce income. This is calculated by dividing net income/profit by the total assets (Elamer & Benyazid, 2018).

Return on Equity (ROE)

ROE is a measure for firm performance, and it shows how much returns the firm is making for its shareholders. This is calculated by dividing net income/profit by the total equity (Elamer & Benyazid, 2018).

3.6.2 Independent Variable

3.6.2.1 Enterprise Risk Management Index (ERMI)

Unlike previous studies by (Liebenberg and Hoyt,2003; Pagach and Warr,2011) who use a simple representation, being, the existence of the Chief Risk Officer(CRO) as a measure of

ERM, this study constructs a thorough index for assessing ERM implementation. ERM in a company shows that company manages or has a high awareness in the various risks they face and have put in place an ERM framework also the presence of ERM brings about investor confidence in the business. (Maharani & Pangestuti, 2024). This ERM Index calculation was put in place to measure ERMI. The Enterprise Risk Management Index was calculated using the following ERM variables, presence of CRO, Board Member on Risk Committee(RC), presence of RC, RC gender diversity, Number of RC meetings, size of RC, presence of Risk Framework, presence of Risk Assessment, and CRO presence on the Executive Board. According to Florio and Leoni (2017), the presence of the above ERMI measure, indicates risk oversight as these oversee the internal controls of an ERM system. The presence of any of the ERM variables was measured using a binary system (0 and 1) where one (1) is for when the ERM variable is present and zero (0) for when the ERM variable is not present. After which an average is taken from a combination of the sum of all the nine binary variables in each year. These features are aggregated to form a composite index for ERM. These features present in a firm prove that an ERM approach to managing risk is in place.

3.6.3 Moderating Variable

3.6.3.1 Firm Size

As discussed in the literature, we employ the size of a firm as a moderating variable. Firm size has no ideal measure as its estimation depends on the purpose of the study (Shalit & Sankar,1977). Firm size under this research is calculated by the total assets of the firm, which is further log-transformed. The total assets of big, medium and small organisations are represented in the data. The size of a firm is important as it indicates to the investor that the business has enough assets and with large firms, it indicates the ability of the firm to reduce cost and enjoy economies of scale and also a larger firm has potential to be attractive for funding from both external and internal stakeholders (Maharani & Pangestuti, 2024;72).

3.6.4 Control Variables

3.6.4.1 Age of Firm

This is seen as how long the business has been in operation since it was established. The age of a firm is a good control variable in relation the moderating variable firm size. “Firm age is the number of years (plus one) elapsed since the year of the company’s IPO” (Loderer et al., 2013; 11). The older the firm gets the more experienced they are in managing their risk as well

as increase productivity by increasing their sales as sales has a direct reflection of the firm's assets (Loderer & Waelchli, 2017).

3.6.4.2 Financial Leverage

Financial Leverage is calculated by the total liabilities divided by the total assets of the firm (Pagach & Warr, 2010). This shows the competence of a firm to pay its debt and still be a going concern. Firms with high operating leverage have high firm performance (Asche et al., 2018). Excessive financial leverage causes a firm to go bankrupt (Horvey & Ankamah,2020). Nevertheless, the adoption of ERM in the organisation assists in proper resource allocation and in the process reduces financial leverage which causes productivity (Bertinetti et al., 2013).

3.6.4.3 Risk Ratio

The risk ratio is considered by taking the total liability divided by the total equity. This is also called the Debt-to-equity ratio which shows how risky an organisation is. According to Susilawati et al (2022), the debt-to-equity ratio helps an organisation determine the amount of funds provided by creditors and company owners of an organisation and a comparison is performed to establish where most of the organisation's funds are coming from. Also, increased debt can be used to relieve the business of taxes and increase business earnings (Limangu & Kautsar, 2024).

3.6.4.4 Net Profit Margin

Net profit margin is a profitability ratio that measures a company's ability to make profit (Hutami, 2012). Revenue is generated by a business in to run its operations, but enough profit needs to be generated from its sales in order for operating costs and overhead costs to be under control. High firm performance is achieved when a business reduces cost through managing its risk exposures (Maharani & Pangestuti, 2024)

3.6.4.5 Efficiency

Efficiency occurs when the resource inputs and gives a high-level output (Palmer & Torgerson, 1999). The proof of efficiency in profitable firm is by their level of net profit. A firm with high operating efficiency is prove there is more output (Horvey & Ankamah, 2020). The more output a firm can achieve proves that their risk has been mitigated which leads to efficiency and eventually causes firm performance (Mupa et al., 2024).

3.7 Estimation Techniques and Regression Model

The study used panel data due to the cross-sectional and time variations of the data. The dynamic Generalised Method of Moments (GMM) technique was used to estimate the results. Griliches and Hausman (1986) encourage the use of GMM on panel data as it helps with the time and cross-sectional measurement problem of data in a panel data analysis. Some other reasons for applying the GMM system estimator are, ‘‘(i) the number of sample firms (i.e., N) used in the study should be greater than the number of time periods in each cross-section (i.e., T), and (ii) corrects possible reverse causality between performance and ERM’’ (Ofori, Gbolonyo & Ojong,2022;7). GMM is used when there is a lag or difference in all the variables (Farooq et al. ,2021). According to Arellano and Bond (1991), one importance of using GMM is its ability to address endogeneity issues. The endogeneity issues come from the lagged dependent variable and the reverse causality between performance and ERM (Farooq, Ahmed & Khan ,2021). Wooldridge (2001) describes the importance of GMM estimators to give very efficient gains because they are a more sophisticated method of moment’s estimator. This allows for GMM to be used on small time periods as it is robust when tested in STATA (Roodman,2009). To assist with the endogeneity problem, FP depends on its lag and other independent variables. This study therefore uses the GMM estimator for the above reasons.

Equation (1) explores the direct effects of ERM on the performance of financial and non-financial firms.

$$FP_{it} = \beta_1 FP_{it-1} + \beta_2 ERMI_{it} + \beta_3 Age_{it} + \beta_4 Efficiency_{\ it} + \beta_5 Leverage_{it} + \varepsilon_{it}$$

…… (Eq. 1)

- Where FP represents firm performance; FP_{it-1} depicts the single lag of firm performance; ERM represents enterprise risk management index; Age represents firm age; Leverage represents firm leverage; β represents the estimated change; and ε_{it} is the error term.

Equation (2) helps to examine the moderating role of firm size on the ERM-performance relationship.

$$FP_{it} = \beta_1 FP_{it-1} + \beta_2 ERMI_{it} + \beta_3 Size_{it} + \beta_4 (ERM * Size)_{it} + \beta_5 Age_{it} + \beta_6 Efficiency_{it} + \beta_7 Leverage_{it} + \varepsilon_{it}$$ ..... (Eq. 2)

- Where FP represents firm performance; FP_{it-1} stands for the single lag of firm performance; ERM represents enterprise risk management index; Size depicts firm size; (ERM*Size) depicts the multiplicative term between ERM and firm size; Age represents firm age; Leverage represents firm leverage; β represents the estimated change; and ε_{it} is the error term.

Equation (1) explores the direct effect of ERM on the performance of financial and non-financial firms whiles equation (2) investigates the moderating role of firm size on the ERM variables which are the presence of CRO, Board Member on RC, RC, RC gender diversity, Number of RC meetings, size of Risk Committee, Risk Framework, Risk Assessment and Chief Risk Officer on the Executive Board) which would eventually lead to performance in financial and non-financial firms. The regression analysis looks at performance (ROA and ROE) as the dependent variable, ERMi as the independent variable, Firm Size as the moderating variable and age of firm, efficiency, financial leverage, risk ratio and net profit margin as the control variables. This study adopts a multicollinearity threshold of 0.8 supported by Wooldridge (2016). Variance Inflation Factors (VIF) was computed confirming the absence of severe multicollinearity. This only revealed one potential issue, ROA and Net Profit Margin correlated at 0.847. These variables were not included together in any single model specification to avoid redundancy.

$$\varepsilon_{it} = \mu_i + \nu_{it}$$

In the decomposed Error term, μ_i represents unobserved, time-invariant firm-specific effects and ν_{it} represents idiosyncratic, time-varying disturbances. This allows for estimation using fixed effects or random effects to account for unobserved heterogeneity across firms.

$$\partial FP_{\text{it}} / \partial ERM_{\text{it}} = \beta_2 + \beta_4 Size_{\text{it}}$$

Following Brambor et al (2006; 11) for Eq.2, the marginal effect of ERM on FP is given by taking the partial derivative of ERM on performance. This allows for the interpretation of ERM's effect at varying firm sizes.

According to Yang et al. (2009), outliers detection the findings pattern in your data which does not follow the anticipated data behaviour.

Figure 7: Financial Institutions Data Set

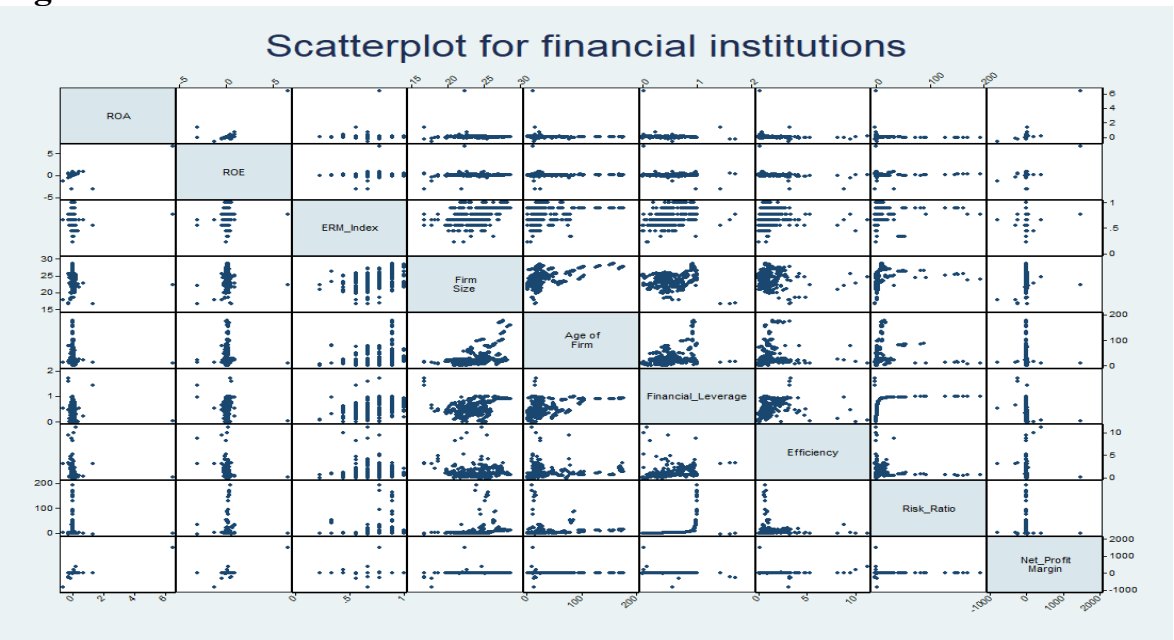


Figure by Aurther

Figure 8: Non-Financial Institutions Data Set

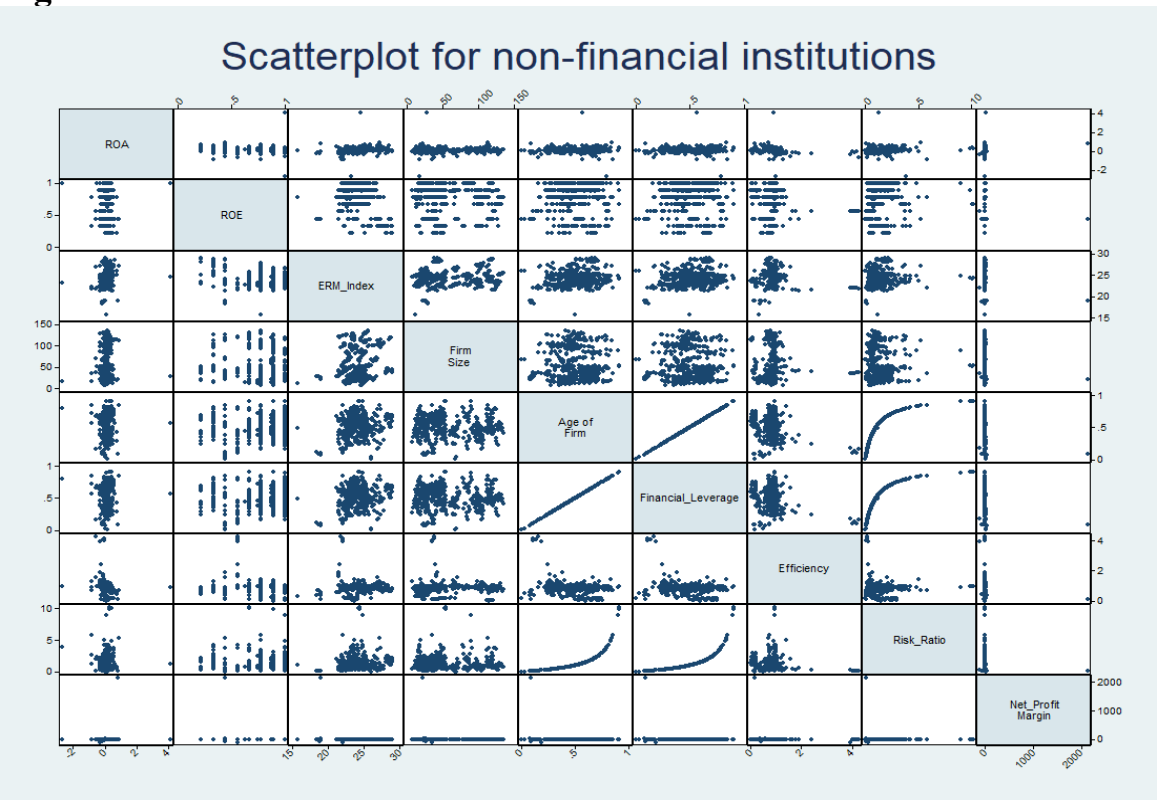


Figure by Aurther

Figure 9: All Institutions Data Set

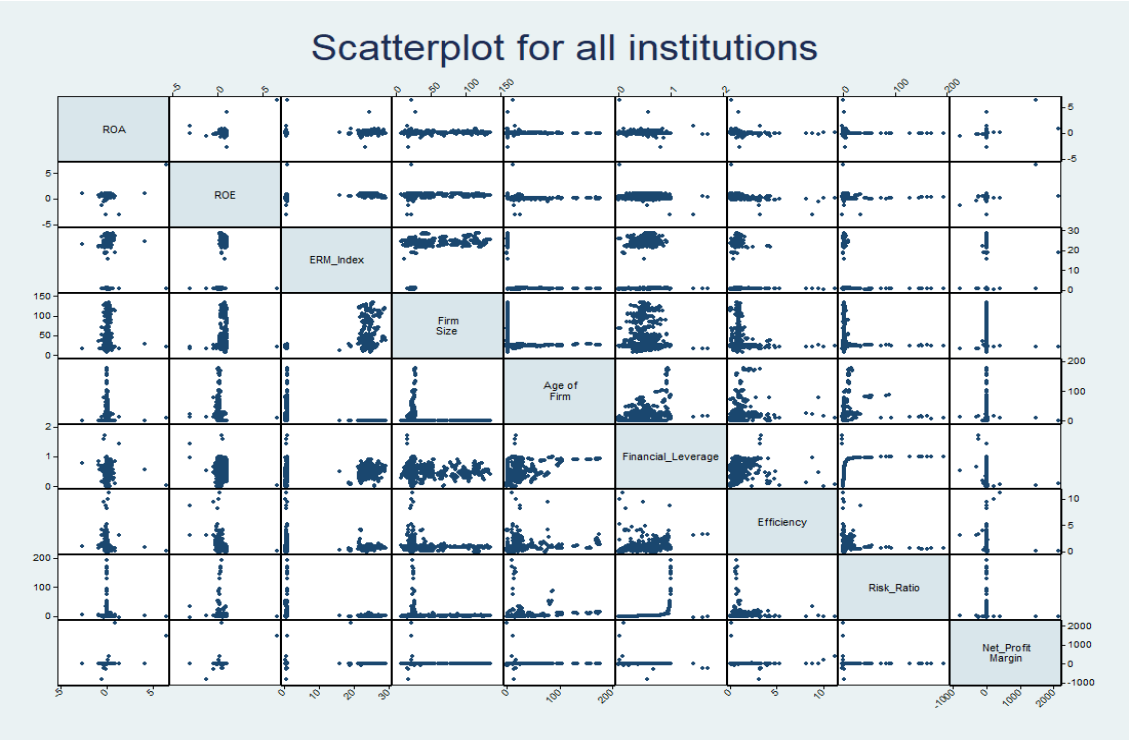


Figure by Aurther

Figure 10: Research Framework

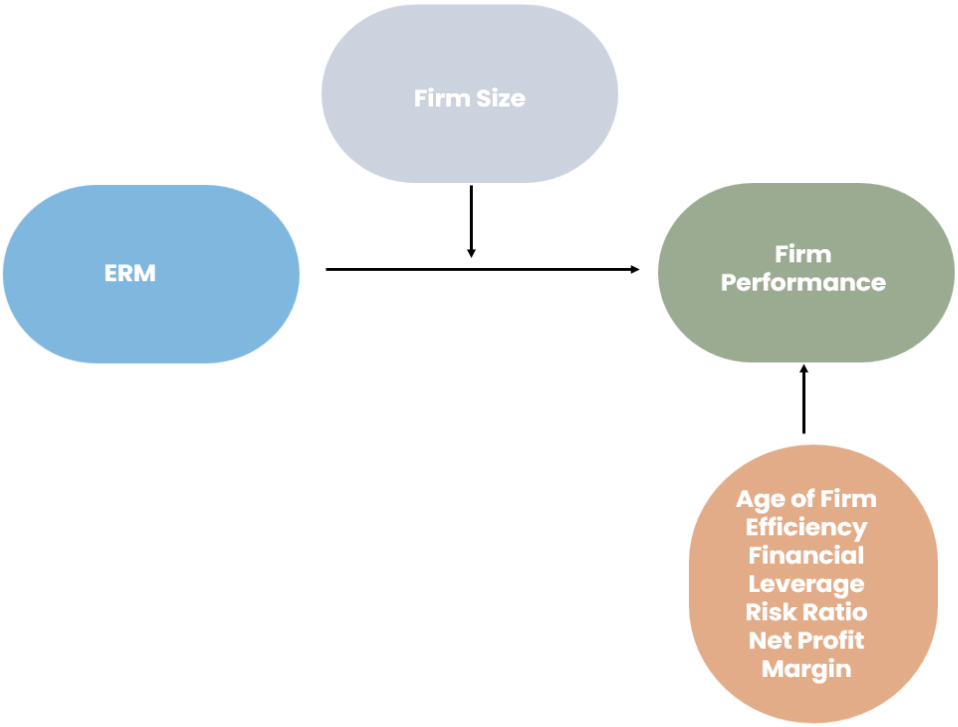


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CHAPTER 4

4 Data Analysis

4.1 Introduction

This chapter of the study presents results, and the corresponding discussions on the main objectives guiding the study. This section delves into the data compiled using the variables explained in the research methodology chapter and covers the descriptive analysis on the key variables considered in the study and the correlation analysis. Furthermore, the study also looked at the impact of ERM on the performance of financial and non-financial organisations on JSE. Similarly, the study looked at the moderating role of firm size on the relationship between ERM and firm performance(FP) of financial and non-financial firms on JSE. The final section presents the discussions and implications of the findings with respect to literature.

4.2 Descriptive Statistics

Information is being provided in the characteristics of the variables by narrating their minimum, maximum, mean, standard deviation, variance, skewness and average values. Table 3 presents the descriptive analysis of the core variables considered in the study. The analysis reveals variations in financial performance, risk management, and firm characteristics across financial, nonfinancial, and all firms. Looking at financial firms, return on assets (ROA) has an average of 0.050 with a wide standard deviation (SD) of 0.319, suggesting variability in profitability. Return on Equity (ROE) shows higher variability with mean of 0.116 and standard deviation of 0.411, with extreme values ranging from -3.094 to 6.572. Financial firms have an average ERM index of 0.739, reflecting strong risk management practices, and a mean firm size of 24.125, indicating moderate scale. The average firm age is 35.901 years, with notable outliers reaching up to 177 years. Financial leverage is moderate (mean = 0.594), while efficiency shows variability (mean = 1.096, SD = 1.217). Risk ratios exhibit substantial dispersion (mean = 8.050, SD = 22.025), and net profit margins are highly skewed (mean = 1.440, SD = 85.250).

Table 2: Descriptive Analysis of Firms

Metric	N	Mean	SD	Min	Max
Financial Firms					
ROA	450	0.050	0.319	-0.582	6.450
ROE	450	0.116	0.411	-3.094	6.572
ERM Index	450	0.739	0.163	0.222	1.000
Firm Size	450	24.125	2.269	16.789	28.690
Age of Firm	450	35.901	37.717	0.500	177.000
Financial Leverage	450	0.594	0.291	0.000	1.703
Efficiency	450	1.096	1.217	0.002	11.231
Risk Ratio	450	8.050	22.025	-3.328	193.715
Net Profit Margin	450	1.440	85.250	-813.020	1481.636
Non-Financial Firms					
ROA	450	0.123	0.303	-2.658	4.137
ROE	450	0.754	0.220	0.222	1.000
ERM Index	450	24.198	1.889	15.836	28.966
Firm Size	450	58.400	36.168	8.000	135.000
Age of Firm	450	0.505	0.166	0.004	0.910
Financial Leverage	450	0.505	0.166	0.004	0.910
Efficiency	450	0.855	0.444	0.004	4.254
Risk Ratio	450	1.341	1.200	0.004	10.168
Net Profit Margin	450	4.371	100.748	-110.539	2131.984
All Firms					
ROA	900	0.086	0.313	-2.658	6.450
ROE	900	0.435	0.459	-3.094	6.572
ERM Index	900	12.469	11.812	0.222	28.966
Firm Size	900	41.262	30.821	8.000	135.000
Age of Firm	900	18.203	32.001	0.004	177.000
Financial Leverage	900	0.550	0.241	0.000	1.703
Efficiency	900	0.976	0.923	0.002	11.231
Risk Ratio	900	4.696	15.945	-3.328	193.715
Net Profit Margin	900	2.906	93.281	-813.020	2131.984

NB: ROA represents Return on Assets and ROE represents Return on Equity

Non-financial firms display higher profitability metrics, with a mean ROA of 0.123 and a mean ROE of 0.754. They exhibit larger firm sizes (mean = 58.400) but younger firms on average (mean age = 0.505). Financial leverage is lower (mean = 0.505), and efficiency is moderate (mean = 0.855). Risk ratios are considerably smaller (mean = 1.341), and net profit margins

are more dispersed (mean = 4.371, SD = 100.748). While financial firms display a low profitability with a mean ROA of 0.05 but a high probability mean ROE of 0.116

When combined, all firms have a mean ROA of 0.086 and ROE of 0.435, with the ERM Index and firm size averaging 12.469 and 41.262, respectively. Net profit margin shows the highest variability (mean = 2.906, SD = 93.281), highlighting significant heterogeneity across sectors.

4.3 Correlation Analysis

This section of the study presents the correlation analysis among the variables of interest, considering financial, non-financial, and all firms combined. Tables 3, 4, and 5, respectively, present the results of the correlation analysis.

Table 3: Correlation Analysis among Financial Firms

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ROA	1.000								
(2) ROE	0.707	1.000							
	(0.000)								
(3) ERM Index	-0.026	0.091	1.000						
	(0.576)	(0.054)							
(4) Firm Size	-0.068	0.096	0.440	1.000					
	(0.152)	(0.041)	(0.000)						
(5) Age of Firm	-0.066	-0.008	0.311	0.522	1.000				
	(0.161)	(0.873)	(0.000)	(0.000)					
(6) Financial Leverage	-0.138	-0.024	0.464	0.400	0.386	1.000			
	(0.003)	(0.619)	(0.000)	(0.000)	(0.000)				
(7) Efficiency	-0.093	-0.250	-0.031	-0.059	0.069	0.154	1.000		
	(0.048)	(0.000)	(0.517)	(0.210)	(0.144)	(0.001)			
(8) Risk Ratio	-0.048	0.065	0.165	0.233	0.065	0.418	-0.015	1.000	
	(0.310)	(0.168)	(0.000)	(0.000)	(0.171)	(0.000)	(0.755)		
(9) Net Profit Margin	0.847	0.686	0.012	0.092	-0.014	-0.156	0.013	-0.006	1.000
	(0.000)	(0.000)	(0.802)	(0.052)	(0.766)	(0.001)	(0.783)	(0.902)	

NB: Statistical significance, at 0.01, 0.05 and 0.10 levels.
ROA represents Return on Assets and ROE represents Return on Equity

The correlation analysis among financial firms reveals several noteworthy relationships. Return on Assets (ROA) and Return on Equity (ROE) exhibit a strong positive correlation, indicating that firms achieving higher returns on their assets are also prone to deliver better

returns to shareholders. Similarly, ROA correlates positively with Net Profit Margin, suggesting that firms with higher profitability ratios tend to utilize their assets more efficiently. However, these relationships are not causal and should be interpreted as indicative of associations rather than definitive effects.

The Enterprise Risk Management (ERM) Index shows a positive correlation with both Firm Size and Age of Firm, implying that larger and more established firms are more likely to implement comprehensive risk management practices. The positive association between ERM Index and Financial Leverage also recommends that firms with higher levels of debt may prioritize structured risk management to mitigate associated vulnerabilities. These findings highlight patterns in corporate risk practices but do not imply that size or leverage directly causes changes in ERM adoption.

Firm Size and Age of Firm are positively correlated, reflecting that older firms are often larger due to their extended periods of growth and establishment in the industry. Financial Leverage also shows moderate positive correlations with both firm size and age, which may indicate that larger, older firms can access greater leverage due to their stability and creditworthiness.

Efficiency and Risk Ratio reveal nuanced relationships, such as a adverse correlation between Efficiency and ROE, and a positive correlation between Risk Ratio and Financial Leverage. These patterns suggest interconnected dynamics but do not establish causal pathways. The results offer insights into the structural and financial characteristics of firms while underscoring the need for further analysis to explore causal mechanisms.

Table 4: Correlation Analysis among Non-Financial Firms

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ROA	1.000								
(2) ROE	0.011	1.000							
	(0.819)								
(3) ERM Index	0.121	-0.217	1.000						
	(0.010)	(0.000)							
(4) Firm Size	-0.011	-0.021	0.130	1.000					
	(0.812)	(0.654)	(0.006)						
(5) Age of Firm	0.025	0.100	0.277	-0.005	1.000				
	(0.597)	(0.035)	(0.000)	(0.918)					
(6) Financial Leverage	0.025	0.100	0.277	-0.005	1.000	1.000			
	(0.597)	(0.035)	(0.000)	(0.918)	(0.000)				
(7) Efficiency	-0.211	-0.048	-0.031	0.000	-0.187	-0.187	1.000		
	(0.000)	(0.311)	(0.511)	(0.999)	(0.000)	(0.000)			
(8) Risk Ratio	0.021	0.023	0.143	-0.008	0.798	0.798	-0.071	1.000	
	(0.661)	(0.632)	(0.002)	(0.867)	(0.000)	(0.000)	(0.132)		
(9) Net Profit Margin	0.119	-0.061	-0.120	-0.044	-0.109	-0.109	-0.091	-0.045	1.000
	(0.012)	(0.194)	(0.011)	(0.354)	(0.020)	(0.020)	(0.054)	(0.343)	

NB: Statistical significance at 0.01, 0.05 and 0.10 levels.
ROA represents Return on Assets and ROE represents Return on Equity

The correlation analysis for non-financial firms uncovers distinct patterns that provide insights into their operational and financial dynamics. Return on Assets (ROA) shows a weak positive correlation with the Enterprise Risk Management (ERM) Index, suggesting that firms with more robust risk management frameworks may marginally improve their asset utilization. However, this relationship is not causative and could be influenced by other factors like industry-specific practices or managerial quality.

The ERM Index is negatively correlated with Return on Equity (ROE), indicating that firms emphasizing risk management may experience lower shareholder returns. This could reflect trade-offs between risk mitigation and aggressive financial strategies. The positive association with ERM Index and Firm Size implies that larger firms are more likely to adopt structured risk management, likely due to greater resource availability and higher regulatory scrutiny.

Age of Firm correlates positively with both ERM Index and Financial Leverage, indicating that older firms may rely more on formalized risk management and leverage their established market presence to access debt. Interestingly, Age of Firm also shares a strong positive

correlation with the Risk Ratio, suggesting that mature firms may accept higher financial risks, potentially due to accumulated stability.

Efficiency is negatively correlated with ROA and Age of Firm, possibly reflecting operational challenges in older firms or a focus on profitability over efficiency. Additionally, Net Profit Margin exhibits a weak but significant positive correlation with ROA, aligning with the expectation that profitability ratios often move in tandem. These correlations underscore relationships that merit deeper exploration to understand underlying causative mechanisms.

Table 5: Correlation Analysis for All Firms

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ROA	1.000								
(2) ROE	0.406	1.000							
	(0.000)								
(3) ERM Index	0.125	0.684	1.000						
	(0.000)	(0.000)							
(4) Firm Size	0.056	0.385	0.565	1.000					
	(0.095)	(0.000)	(0.000)						
(5) Age of Firm	-0.104	-0.389	-0.547	-0.285	1.000				
	(0.002)	(0.000)	(0.000)	(0.000)					
(6) Financial Leverage	-0.098	-0.125	-0.165	-0.087	0.378	1.000			
	(0.003)	(0.000)	(0.000)	(0.009)	(0.000)				
(7) Efficiency	-0.127	-0.244	-0.131	-0.076	0.126	0.115	1.000		
	(0.000)	(0.000)	(0.000)	(0.023)	(0.000)	(0.001)			
(8) Risk Ratio	-0.057	-0.106	-0.207	-0.106	0.169	0.408	0.013	1.000	
	(0.085)	(0.001)	(0.000)	(0.002)	(0.000)	(0.000)	(0.700)		
(9) Net Profit Margin	0.458	0.276	0.005	-0.016	-0.017	-0.129	-0.018	-0.009	1.000
	(0.000)	(0.000)	(0.873)	(0.634)	(0.619)	(0.000)	(0.594)	(0.792)	

NB: Statistical significance at 0.01, 0.05 and 0.10 levels.
ROA represents Return on Assets and ROE represents Return on Equity

The correlation analysis for all firms provides a detailed view of the relationships between key financial metrics. Return on Assets (ROA) is positively correlated with Return on Equity (ROE) and the Enterprise Risk Management (ERM) Index, suggesting that firms with greater asset returns also tend to have stronger profitability and better risk management systems in place. This aligns with the idea that firms with solid risk controls and efficient use of assets are more likely to generate favourable equity returns. The noteworthy positive relationship between ROA and ERM Index highlights the potential benefit of a well-structured risk management framework in improving firm profitability.

Firm Size shows a moderate positive correlation with both ROE and the ERM Index, which may indicate that larger firms are more likely to accept robust risk management procedures and experience higher returns on equity. This is consistent with the greater resource availability and scale advantages that large firms typically enjoy. Conversely, Firm Size is only weakly correlated with ROA, which could suggest that while larger firms are more profitable in terms of equity returns, this does not directly translate into a more efficient use of assets.

Age of Firm shows a negative correlation with the ERM Index, Financial Leverage, and Risk Ratio, implying that older firms may take on more financial risks and are less likely to prioritize structured risk management, possibly due to their established market presence. Additionally, Financial Leverage has an adverse correlation with ROA and ROE, reflecting that firms with higher leverage may experience lower asset returns and profitability, likely due to the risks associated with high debt levels. Lastly, Net Profit Margin exhibits a positive relationship with ROA, emphasizing that more profitable firms tend to also achieve higher asset returns. However, the overall weaker correlations across other variables suggest that further exploration is needed to uncover more nuanced relationships between financial metrics.

4.4 The Impact of ERM on Firm Performance

This section of the study examines the impact of the Enterprise Risk Management (ERM) Index on the performance of financial and non-financial organizations listed on the Johannesburg Stock Exchange (JSE). Using Generalized Method of Moments (GMM) panel regression analysis, the study aims to provide understanding on how the implementation of ERM practices influences the performance metrics Return on Assets (ROA) and Return on Equity (ROE) by focusing on both financial and non-financial firms. This analysis highlights potential differences in the relationship between ERM adoption and firm performance across these sectors. The outcomes contribute to comprehension of the benefit of ERM in enhancing firm performance within the South African market context.

Table 6 examines the outcome of the ERM Index and other variables on ROA and ROE across financial firms, non-financial firms, and all firms combined.

Table 6: The Effects of ERM index on ROA and ROE

Model	ROA Financial	ROA non-financial	ROA (All Firms)	ROE Financial	ROE non-financial	ROE (All Firms)
L1 ROA	0.065 (0.023) ***	0.185 (0.106) *	0.071 (0.038) *	0.115 (0.102)	0.662 (0.243) ***	0.103 (0.049) **
ERM Index	0.161 (0.075) **	0.571 (0.299) **	0.471 (0.127) ***	0.682 (0.288) **	0.361 (0.200) *	1.389 (0.622) **
Firm Size	0.113 (0.050) **	0.038 (0.043)	0.030 (0.029)	0.853 (0.182) ***	0.039 (0.056)	0.090 (0.036) **
Age of Firm	-0.022 (0.064)	0.665 (1.887)	0.106 (0.079)	-1.008 (1.943)	-0.645 (1.231)	-0.011 (0.041)
Financial Leverage	-0.149 (1.728)	-0.216 (0.216)	-0.223 (0.365)	-0.754 (0.409) *	-0.254 (0.241)	-1.262 (1.950)
Efficiency	0.076 (0.012) ***	0.065 (0.307)	0.019 (0.112)	1.119 (0.374) ***	0.038 (0.112)	0.205 (0.285)
Risk Ratio	-0.002 (0.007)	-0.176 (0.292)	-0.025 (0.041)	-0.026 (0.049)	-0.146 (0.213)	-0.002 (0.003)
Net Profit Margin	0.104 (0.041) **	0.102 (0.043) **	0.084 (0.042) **	0.103 (0.019) ***	0.101 (0.058) *	0.114 (0.052) **
Diagnostics						
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	350	350	700	350	350	700
AR (1)	0.028	0.048	0.046	0.016	0.048	0.040
AR (2)	0.216	0.400	0.780	0.576	0.772	0.542
Hansen	0.335	0.890	0.653	0.457	0.980	0.516
Number of Instruments	15	15	15	15	15	15

NB: *p-value <0.10; **p-value <0.05 *** p-value <0.01

This analysis highlights the roles of ERM, firm characteristics, lagged performance, firm size and other financial indicators. This research models the ERM index to contain nine ERM variables. The ERM index showed a remarkable impact on firm performance with firms in all categories when tested with ROA and ROE. Both ROA and ROE in all firm categories showed a positive effect with the ERM Index. The test with ROA for financial firms and the ERM Index showed a positive and significant coefficient of 0.161 ($p < 0.05$). This indicates that a strong risk management application improves financial performance, and the effect is even stronger for non-financial firms (0.571, $p < 0.05$), suggesting that ERM practices are particularly effective in this sector. ROA for all firms combined, the impact of the ERM Index remains positive and highly significant (0.471, $p < 0.01$), demonstrating that effective risk management is crucial for improving overall firm performance. Where with ROE, for financial firms the ERM Index has a coefficient of 0.682 ($p < 0.05$), suggesting a positive relationship between ERM practices and equity performance. Non-financial firms also show a positive effect, with a coefficient of 0.361 ($p < 0.10$), suggesting that ERM practices are beneficial, although the effect is smaller compared to financial firms. For all firms combined, the ERM Index has a much stronger positive effect (1.389, $p < 0.05$), highlighting the importance of risk management in enhancing overall firm equity. As explained by Maharani and Pangestuti (2024), larger firms send a positive signal to investors which leads to further investment in the firm. The test showed the non-financial firms having a positive effect on firm performance because they had a larger asset based.

These diagnostics confirm model validity, with AR (1) tests indicating first-order autocorrelation but no second-order serial correlation as reported by AR (2). The insignificant values the Hansen statistics support the validity of instruments, ensuring robust findings. Overall, the ERM Index and L1 ROA are critical for profitability, with notable dissimilarity between financial and non-financial firms and results on ROE emphasize that ERM practices, Net Profit Margin, Firm Size, and Efficiency are the key determinants of ROE. These findings emphasize the need for tailored strategies to enhance firm performance.

L1 ROA (lagged ROA) has a positive influence on current ROA across all firm types, indicating that past performance is a reliable predictor of future performance. This effect is most pronounced for non-financial firms (0.185, $p < 0.10$), followed by financial firms (0.065, $p < 0.01$) and all firms (0.071, $p < 0.10$). Compared to L1 ROE (lagged ROE) this predicts significant current ROE for non-financial firms at (0.662, $p < 0.01$), indicating that past

performance strongly influences future equity returns in this sector. However, the effect is weaker for financial firms (0.115, $p > 0.10$) and all firms combined (0.103, $p < 0.05$).

Firm Size with ROA shows a significant positive effect only for financial firms (0.113, $p < 0.05$), suggesting that larger financial firms tend to perform better due to economies of scale or other size-related advantages. However, the effect of firm size is negligible for non-financial firms and all firms combined, implying that size may not be as important for performance in these sectors. Firm Size with ROE also shows a significant and strong positive effect for financial firms (0.853, $p < 0.01$), suggesting that larger financial firms enjoy better equity returns, likely due to economies of scale and other size-related factors. The effect of firm size is insignificant for non-financial firms, and only moderately significant for all firms combined (0.090, $p < 0.05$), indicating that firm size may not play a major role in improving equity returns in the non-financial sector.

Net Profit Margin with ROA is a consistent and significant positive predictor of ROA across all categories. The coefficients for this variable range from 0.084 ($p < 0.05$) to 0.104 ($p < 0.05$), highlighting the importance of profitability in driving firm performance.

Net Profit Margin with ROE is a consistent and significant positive predictor of ROE. For financial firms, the coefficient is 0.103 ($p < 0.01$), and for non-financial firms, it is 0.101 ($p < 0.10$). For all firms combined, the effect is also significant (0.114, $p < 0.05$), highlighting the importance of profitability in driving equity performance across sectors.

Efficiency with ROA is significant only for financial firms (0.076, $p < 0.01$), indicating that efficient operations are crucial for improving performance in this sector, but not as influential in non-financial firms or all firms. Efficiency with ROE is highly significant for financial firms (1.119, $p < 0.01$), highlighting the crucial role of operational efficiency in improving equity returns. However, the effect is much smaller and insignificant for non-financial firms and all firms combined.

ROA with other variables, such as Age of Firm, Financial Leverage, and Risk Ratio, show insignificant effects in all categories, suggesting they do not have a strong impact on ROA in the context of this study. ROE with Financial Leverage shows a negative but significant effect for financial firms (**-0.754, $p < 0.10$**), indicating that higher leverage may reduce equity returns in this sector. However, it has no significant effect for non-financial firms, or all firms combined, suggesting that leverage may not be as influential in non-financial sectors. ROE with Age of Firm shows a negative but significant effect for financial firms (**-1.008**, **$p < 0.10$**), and for non-financial firms (**-0.645**, **$p < 0.10$**). The Risk Ratio does not show any significant impact on ROE across all categories, suggesting that risk-taking, as measured

by this ratio, does not have a major influence on equity returns. Also, ROE with Risk Ratio does not show any significant impact on ROE across all categories, suggesting that risk-taking, as measured by this ratio, does not have a major influence on equity returns.

In summary, the effects of ERM index on ROA highlights that ERM practices, lagged ROA, and Net Profit Margin are the key drivers of performance. The effect of these factors varies between financial and non-financial firms, with financial firms benefiting more from firm size and efficiency. Whiles in ROE conclusion, the results emphasize that ERM practices, Net Profit Margin, Firm Size, and Efficiency are the key determinants of ROE.

4.5 The Moderating Role of Firm Size on the ERM-Performance Relationship

After the discussion of the impact of Enterprise Risk Management (ERM) on firm performance(FP), this section further examines the role firm size plays in moderating the relationship in financial and non-financial organizations listed on the Johannesburg Stock Exchange (JSE). The analysis provides insight into how Enterprise Risk Management with firm size determines Return on Assets (ROA) and Return on Equity (ROE) across financial, non-financial, and all firms. This analysis will highlight potential differences in the relationship between ERM and FP and organisational performance across these sectors. The findings contribute to understanding the enhancing value of firm size in ERM-performance relationship within the South African market context. Table 7 and 8 examines the moderating effect of firm size and other variables on Return on Assets (ROA) and Return on Equity (ROE) across financial firms, non-financial firms, and all firms combined.

Table 7: Moderation Effect of Firm Size on ROA

Variable	Financial ROA (1)	Financial ROA (2)	Financial ROA (3)	Non-Financial ROA (1)	Non-Financial ROA (2)	Non-Financial ROA (3)	All Firms ROA (1)	All Firms ROA (2)	All Firms ROA (3)
L1 ROA	0.060 (0.084)	0.065 (0.073)	0.088 (0.079)	0.185 (0.166)	0.115 (0.126)	0.880 (0.908)	0.121 (0.048) **	1.369 (0.408) ***	0.105 (0.028) ***
ERM Index	0.142 (0.049) ***	0.061 (1.868)	0.458 (0.239) *	0.572 (0.301) *	0.472 (0.191) **	0.300 (0.143) **	0.364 (0.179) **	0.507 (0.285) *	0.158 (0.082) *
Age of Firm	-0.024 (0.048)	-0.022 (0.064)	-0.054 (0.053)	-0.123 (1.023)	0.464 (1.224)	1.785 (8.427)	-0.023 (0.026)	-0.937 (0.469) **	-0.008 (0.019)
Financial Leverage	-0.077 (0.751)	-0.149 (1.728)	-0.154 (0.916)	-0.660 (1.884)	-0.049 (0.214)	-0.254 (0.214)	-0.122 (0.924)	-0.102 (0.374)	0.176 (0.727)
Efficiency	0.086 (0.122)	0.076 (0.112)	0.022 (0.094)	0.065 (0.307)	0.045 (0.204)	0.158 (0.563)	0.025 (0.062)	0.921 (0.572) *	-0.018 (0.060)
Risk Ratio	-0.003 (0.005)	-0.002 (0.007)	-0.003 (0.003)	-0.176 (0.292)	-0.216 (0.301)	-0.338 (2.379)	-0.002 (0.002)	0.033 (0.178)	-0.040 (0.013) ***
Net Profit Margin	0.104 (0.023) ***	0.102 (0.041) **	0.100 (0.051) *	0.088 (0.041) **	0.078 (0.043) *	0.016 (0.038)	0.094 (0.044) **	0.078 (0.021) ***	0.064 (0.040)
Firm Size		0.113 (0.050) **	0.602 (0.478) **		0.038 (0.043)	1.332 (6.251)		0.356 (0.192) *	0.193 (0.050) ***
ERM Index × Firm Size			0.360 (0.135) ***			0.153 (0.072) **			0.106 (0.046) **
Net Effect			9.143			9.235			4.532
Diagnostics									
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	350	350	350	350	350	350	700	700	700
AR (1)	0.045	0.020	0.011	0.048	0.046	0.032	0.047	0.014	0.015
AR (2)	0.484	0.216	0.370	0.400	0.382	0.486	0.447	0.432	0.418
Hansen	0.592	0.335	0.641	0.890	0.721	0.922	0.372	0.345	0.854
Number of Instruments	15	15	15	15	15	15	15	15	15

*NB: *p-value <0.10; **p-value <0.05 *** p-value <0.01*

Table 8: Moderation Effect of Firm Size on ROE

Variable	Financial ROE	Financial ROE	Financial ROE	Non-Financial ROE	Non-Financial ROE	Non-Financial ROE	All Firms ROE	All Firms ROE	All Firms ROE
L1 ROA	0.193 (0.049) ***	0.115 (0.442)	0.055 (0.400)	0.660 (0.944)	0.660 (0.944)	0.614 (1.082)	0.905 (0.198) ***	0.895 (0.241) ***	0.090 (0.293)
ERM Index	0.537 (0.035) ***	0.682 (0.318) **	0.942 (0.491) *	0.365 (0.133) ***	0.365 (0.108) ***	0.237 (0.141) *	0.491 (0.225) **	0.111 (0.048) **	0.761 (2.228)
Age of Firm	-0.010 (0.250)	-1.008 (1.943)	-0.293 (1.615)	-0.667 (1.230)	-0.667 (1.230)	-0.592 (1.396)	-1.208 (2.786)	-0.354 (1.084)	-0.002 (0.047)
Financial Leverage	-0.177 (0.408)	-0.754 (0.709)	-0.512 (0.752)	-0.254 (0.245)	0.421 (0.142) ***	-0.025 (0.214)	-0.888 (0.971)	-0.038 (1.715)	-1.680 (2.235)
Efficiency	0.382 (0.835)	1.119 (0.374) ***	0.601 (1.936)	0.038 (0.112)	0.038 (0.112)	0.029 (0.147)	0.029 (1.578)	0.000 (0.045)	-0.192 (0.299)
Risk Ratio	-0.010 (0.024)	-0.026 (0.049)	-0.006 (0.040)	-0.146 (0.213)	-0.146 (0.213)	-0.147 (0.211)	-0.040 (0.041)	-0.014 (0.045)	-0.002 (0.002)
Net Profit Margin	0.009 (0.002) ***	0.003 (0.009)	0.005 (0.006)	0.011 (0.011)	0.021 (0.101)	0.021 (0.041)	0.013 (0.039)	0.014 (0.045)	0.004 (0.002) **
Firm Size		0.853 (0.382) **	0.618 (0.288) **		0.038 (0.057)	0.056 (0.184)		0.174 (0.074) **	0.286 (0.353)
ERM Index × Firm Size			0.899 (0.451) **			0.042 (0.009) ***			0.109 (0.014) ***
Net Effect			22.630			2.690			5.259
Diagnostics									
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	350	350	350	350	350	350	350	350	350
AR (1)	0.045	0.022	0.045	0.035	0.026	0.021	0.031	0.025	0.033
AR (2)	0.273	0.576	0.472	0.772	0.559	0.735	0.852	0.486	0.628
Hansen	0.160	0.457	0.616	0.890	0.980	0.866	0.777	0.475	0.511
Number of Instruments	15	15	15	15	15	15	15	15	15

NB: *p-value <0.10; **p-value <0.05 *** p-value <0.01

The moderation results (Table 7 and Table 8) highlight key interactions between the Enterprise Risk Management Index (ERMI) and firm size in determining Return on Assets (ROA) and Return on Equity (ROE) across financial, non-financial and in all firm categories. The analysis highlights the roles of enterprise risk management (ERM), firm characteristics, lagged performance, firm size and other financial indicators. The ERM Index positively influences ROA across all firm categories, but its effects vary in strength.

ROA for financial firms, the ERM coefficient (**0.142, p < 0.01**) indicates a significant and strong impact, while for non-financial firms, the effect is positive but weaker (**0.572, p < 0.10**). For all firms, ERM remains significant with a moderate impact (**0.364,** p < **0.05**). This highlights that ERM practices are critical for enhancing firm performance, with a stronger role in financial firms. For ROE only financial firms reveal that ERM Index has a significant positive impact on ROE across all models, with coefficients ranging from (**0.537, p < 0.01**) to 0.942 (p < 0.10). This indicates that effective risk management practices drive financial firms' equity performance.

Analysing Firm size for ROA the results exhibit a positive effect on ROA, particularly for all firms (**0.193, p < 0.01**) and financial firms (**0.113, p < 0.05**). In non-financial firms under ROA firm size shows no significant effect on its own, however, the interlinkage between ERM and firm size is significant for both non-financial (**0.360, p < 0.01**) and all firms (**0.153, p < 0.05**), indicating that larger firms see amplified benefits from ERM practices, particularly in non-financial sectors. Analysing Firm size for ROE and the interaction term ERM Index × Firm Size are positively significant in later models, indicating that larger firms have more resources to invest in the implementation of ERM (**0.899, p < 0.05**). However, other variables, such as Efficiency and Risk Ratio, show inconsistent effects and are generally insignificant. For non-financial firms, the ERM Index is a consistent and significant positive predictor of ROE, with coefficients like (**0.365, p < 0.01**) across different models. However, lagged ROA is less significant compared to financial firms. Notably, the interaction between ERM Index and Firm Size has a outstanding positive impact (**0.042, p < 0.01**), underscoring that the benefits of ERM practices are amplified for larger firms in the non-financial sector.

For all firms combined, the ERM Index remains a significant driver of ROE, particularly when firm size is included as a moderating factor. The coefficients, such as **0.491 (p < 0.05)** and **0.761 (p > 0.10)**, indicate a robust positive relationship between ERM practices and ROE. Lagged ROA (L1 ROA) is significant in the first two models, with coefficients like **0.905 (p < 0.01)**, affirming the role of past performance. Additionally, Firm Size positively

affects ROE (**0.174, p < 0.05**), and its interaction with the ERM Index (**0.109, p < 0.01**) further enhances this relationship.

In summary, ERM has a stronger direct impact on financial firms, while its interaction with firm size benefits non-financial firms more than financial firms with ROA whiles Firm size independently drives financial and all firms in ROA, underscoring its importance alongside profitability. Whereas the overall result in ROE highlights the importance of ERM practices, firm size, and past performance in driving ROE and financial firms derive stronger benefits from risk management, while non-financial firms exhibit more nuanced relationships with firm size and leverage. The Hansen test indicates the validity of instruments used in the analysis, with p-values above 0.10 in all cases.

4.6 Discussion of the Results

4.6.1 The Impact of ERM on Performance

This study elaborates on the role of Enterprise Risk Management (ERM) in promoting firm performance(FP) in South African businesses. The test proved that the impact of the ERM on performance represented by Return on Assets (ROA) and Return on Equity (ROE) across financial firms, non-financial firms, and all firms combined causes FP. This supports the finding of Florio & Leoni (2017), Silva, Silva & Chan (2019), Horvey & Ankamah (2020). Saeidi et al. (2024) showed that a positive link exists and aligns ERM and firm performance. This result is in accordance with the agency theory and the contingency theory of ERM. Where risk management is used to manage cost, agency theory places a role, and where larger firms have more access to resources to invest in the implementation of an effective ERM framework, contingency theory of ERM theory applies.

ERM has a positive effect on firm performance testing through Return on Assets (ROA) and Return on Equity (ROE). This shows the presence of strong risk management practices in financial firms, non-financial firms, and all firms combined. The study revealed that ERM helps identify potential risks and opportunities related to the firm due to the presence of governance in an organisation that has an ERM framework.

On the control variables there was also a direct negative reaction between age of firm and performance (ROA and ROE) which means an increase in the age of a firm causes a decrease in profitability. This is supported by Loderer et al. & Waelchli (2017), who argue that one of the reasons for such a movement is that older firms do not invest in newer inventions

and stick to their old ways of doing things. Test on other financial indicators such as financial leverage, risk ratio, net profit margin, and efficiency, show a negative reaction between the indicators and performance (ROA and ROE). Thus, an increase in these indicators causes a decrease in profitability.

The test results revealed that ERM implementation in financial and non-financial organisations leads to firm performance linked to H1.

4.6.2 The Moderating role of Firm Size on the ERM-Performance Relationship

This study elaborates on the role of Enterprise Risk Management (ERM) and firm size in promoting performance in South African businesses. Firm Size has a positive moderating influence on the ERM-performance relationship using Return on Equity (ROE) and shows a positive reaction for financial firms and all firms combined, and a negative reaction for non-financial firms when testing Return on Assets (ROA). This study revealed that larger firms benefit more from the ERM implementation as larger firms implement more risk management practices due to larger resource availability and investor interest in them. Also, larger firms have more market reach, which brings external and internal stakeholders to invest in cases of high cash flow, which leads to performance (Maharani & Pangestuti, 2024).

The test also proved that the moderating variable has a positive impact on the ERM-performance relationship. This supports the findings by Malik et al. (2020), Maharani & Pangestuti (2024). ERM was assessed comprehensively through the ERM index using nine ERM variables. There was a significant positive correlation between ROA and ERM Index which highlights the potential benefits of a well-structured risk management framework in the improvement of both financial and non-financial firms' profitability. Moreover, the ERM Index had a positive correlation with Firm Size and Age of Firm which means that the larger the firms the more they implement extensive risk management practices with the average age of a firm being eighteen and the oldest being hundred and seventy-seven years and the average size of a firm is forty-one and the maximum firm size is one hundred and thirty-five. This supports the notion by Florio and Leoni (2017) that ERM is affected by the relationship between Firm Size and Age of Firm, where firm size affects the resources available in the firm and the firm resources available are based on the firm's age.

The test results revealed the moderating role of firm size on the relationship between ERM and firm performance of financial and non-financial organisations linked to H2 are accepted.

CHAPTER 5

5 Conclusion

5.1 Introduction

This study explores the moderating role of firm size on the relationship between ERM and firm performance(FP) of the listed firms on the JSE. The research considered both financial and non-financial firms, which adds to the existing literature on ERM and the JSE, as both have limited tests on ERM and firm size.

5.2 Summary and Conclusion

This study highlights the importance of ERM practices in the performance of firms listed on the JSE while analysing firm size as a moderating variable. Performance was tested using ROE and ROA. One hundred (100) firms listed on the JSE were tested with 50 financial and 50 non-financial organisations. The test is performed on financial organisations as one category, non-financial organisations as another category and lastly a category of all 100 organisations. ERM has a positive effect on FP testing through ROA and ROE. Firm size also has a significant effect on ERM and FP for financial firms for both ROA and ROE. While there is a non-significant effect of firm size on the ERM-performance relationship for non-financial firms for both ROA and ROE, this proves that financial firms derive stronger benefits from risk management, while non-financial firms do not derive its benefits from risk management. The industries in which non-financial firms operate also influence their performance, as the test proved their asset base to be larger than that of the financial firms tested. Firm size also exhibited a positive effect on ROA for financial firms and all firms combined but is not positive for non-financial firms when they interact directly with each other. Firm Size and the interaction term ERM Index of Firm Size on ROE are positively significant, indicating that larger firms benefit more from risk management practices. Firm Size has a significantly positive impact on ERM practices because of larger firms in the non-financial sector. ROE yielded different results, as all three categories had a positive turn-out on ERM and FP. All financial firms follow strict regulatory requirements due to their industry and risk exposures and therefore react positively to the implementation of ERM whiles non-financial firms only

implement ERM based on their industry exposures and therefore do not have strict regulatory requirements. This test confirmed H1 and H2. Therefore, a relationship exists between ERM, performance, and firm size.

5.3 Policy Recommendations

Based on research findings, it was revealed that ERM contributes to firm performance and that bigger and more established firms are more likely to implement comprehensive risk management procedures because of the positive interaction with firm size. Businesses should ensure that ERM frameworks are practiced mitigating risk exposures. This study leads to the following policy recommendations as ERM practices bring about firm performance through the reduction of risk exposures in businesses. Firm managers should monitor and stress on the importance of ERM to prevent a tick-box ERM system especially in non-financial firms. Also, industry regulators can contribute to the sustainability of ERM in businesses by auditing companies and fining them when they are found to be non-compliant. In addition to this, policymakers must fine State-Owned Entities that do not follow the required legislation and monitor private entities. Policy makers should further devise a way to enforce ERM with private entities as all firms should benefit from ERM. It is recognised that firm size leads to a positive reaction in the ERM-performance relationship because larger firms have more resources to invest and oversee the different risks faced by the organisation by reducing costs and enjoying economies of scale. More diverse firms should be analysed to firmly identify which industry contributes to firm performance. The ERM-performance relationship has been tested and should be implement by businesses to ensure long-term efficiency and productivity in firms.

5.4 Limitations and Future Directions

This research was limited to a sample of one hundred (100) organisations on the JSE and, a larger sample size can be tested for a more accurate result and the elements that make up the ERM index should be increased. Future studies can include analysis of the elements of the present ERM framework, considering that this represents the presence of ERM in the organisation and, therefore, management of risk exposures. Also, another proxy for measuring FP and firm size can be introduced into the test, which would allow the results to be further confirmed. Firm size can also be analysed looking at the 25th, 50th, 75th and 95th quantiles.

Furthermore, future studies can investigate other contingency tests that would broaden the contribution on the ERM-performance relationship.

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