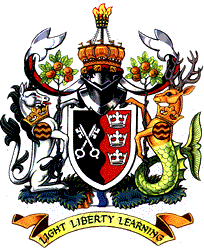
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**Does enterprise risk management affect technological firms’ value? Evidence from United Kingdom listed tech companies.**

A Project presented in part requirement of the degree of Bachelor of Science with honours

in Banking and Finance of the University of the West of England, Bristol.

Academic year of presentation: 2023/2024

Faculty of Business and Law

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## Acknowledgements

From the start till the end of this project, I have always been very lucky because of the support that I received from many people around me.

I would like to express my deepest gratitude to my supervisor Dr Maksud Onal, who has personally given me valuable guidance, through insightful conversations, recommendations, as well as encouragement, which has contributed greatly to the completion of this dissertation. I also want to extend my appreciation to all the UWE staff who have helped me on this journey of knowledge.

I would also want to personally say thanks to my family, all my friends and my girlfriend June. They always motivate and make me truly believe in myself, which has helped me go through this research and my university adventure.

## Abstract

The 21st century has been shaped by the continuous revolution and evolution within the technology sector, leading to increasing uncertainty and complexity in every aspect of society each day. Amidst rapid technological advancements and increasing market complexities, Enterprise Risk Management (ERM) stands as a strategic imperative, purportedly enhancing firm resilience and value through holistic risk assessments and mitigation strategies. However, the current research about the relationship between ERM and technology firms is extremely limited, and a clear link between the two has not been established. The aim of this study is to test the association between tech firms’ valuation and the increase in the quality of ERM, bridging this gap and contributing to the overall literature on ERM. This study does this by using Ordinary Least Square analysis on a sample of 100 technology companies listed on the London Stock Exchange in 2022, to see if higher quality of ERM leads to higher Tobin’s Q. The main finding of this study is that there is no significant link between better ERM and higher firms’ value.

## I. Introduction:

During a modern time in the business world, there is an unnoticed revolution. This revolution is centered around Enterprise Risk Management (ERM), a concept that has rapidly ascended to prominence in the modern business landscape (Viscelli et al., 2016). It is no longer a mere buzzword but has become a linchpin in determining the survival and triumph of companies in an increasingly complex and unpredictable market (Acharyya, 2009; Hoyt and Liebenberg, 2011). The change shows a deep alteration, moving risk management up from being an everyday task to a crucial factor in achieving financial triumph.

ERM, by breaking away from old-fashioned risk management methods, supports a total organization viewpoint. This change in mindset has transformed businesses' understanding and handling of risks, shifting them from looking at risks separately to a combined strategy. This new method is guiding companies towards having an all-inclusive and powerful risk management structure (Gordon et al., 2009). ERM is not just about reducing risks; it is about using those risks as fuel for value making within organizations (Pagach and Warr, 2010).

While ERM has been examined in many fields, its use and influence in finance area especially insurance and banking have been the main subject of numerous studies (McShane et al., 2011; Hoyt and Liebenberg, 2011; Bailey, 2019; Oyewo, 2021; Pagach and Warr, 2010 ; Kumah and Sare , 2013). There are studies that go beyond financial firms (Horvey and Ankamah,2020 ; Florio and Leoni,2017), also some have studied industries like manufacturing (Pan et al., 2022). However, there is still a big gap in research for the technology sector, which has been as important as a sculptor who is constantly shaping the modern world. This area is prone to the common risks across all industries and has its own niche risks. These can include quick loss of technology value, dangers to cybersecurity, and a changing regulatory scene.

This paper tries to fill in this gap by examining how ERM affects the valuation of technology companies, especially those on the London Stock Exchange. The goal is to uncover if using ERM as a part of strategy in tech companies helps protect them from risks and at same time improves their market worth. The knowledge we get from this study can be very useful for managers in the technology field, giving them a way to see things better so they make smarter choices that might increase their market value and competitive power.

## II. Literature Review

### Challenges for risk management of technology firms

When talking about the technology industry, rapid technological changes and cybersecurity threats can be considered as two of the most unique and severely faced problems that the firms within the sector have to encounter. Technology companies must continuously innovate and adapt to stay relevant. This rapid pace of innovation can lead to increased investment risks, as the technology in question is often unproven, with its application yet to be demonstrated. There are risks of longer-than-expected development times, failure of the technology to work, or being superseded by competitors' offerings (Mason and Harrison, 2004). Moreover, the lifecycle of technology products is typically short, making sustained revenue generation challenging. Another notable challenge within this risk, as reported by Deloitte (2019) is the lack of comprehensive enterprise-wide strategies for adopting everything-as-a-service (XaaS) models. This lack of a comprehensive strategy can lead to problems such as cost overruns and poor interoperability, highlighting the risk associated with rapidly evolving technology and the need for strategic planning. Their report also mentions that the rapid increase in the use of social media and the massive amount of user data involved have raised concerns about data protection. In fact, many companies have been cautious in their innovation strategies due to cybersecurity concerns. According to Deloitte’s 2018 AI Survey, 18% of respondents reported halting an AI initiative in progress due to cybersecurity worries, and 22% decided not to start an AI program because of these concerns. This situation underscores the importance of effective cybersecurity management, which is often better handled by large cloud providers and vendors with more extensive experience and resources.

The Deloitte Technology Industry Outlook for 2023 has mentioned vital fresh hurdles that are being confronted by the technology sector. Macroeconomic uncertainty is one of these key difficulties, causing less consumer expenditure along with reduced product need and market values. Tech firms are trying to handle these changes by concentrating on methods that can increase their margins and revenue growth. These are: increasing business efficiency, using smart automation, updating old systems, and looking into strategic mergers and acquisitions. There is a big risk from global uncertainties and problems with the supply chain. The tech industry is heavily reliant on Asian manufacturing for digital components and hardware which makes it vulnerable to political conflicts, disruptions in supply chains, lack of materials as well as difficulties in obtaining semiconductor supplies. Risks are multiplied by situations such as China's COVID-19 challenges and the Russian-Ukraine conflict. This can lead to problems in finding enough products, services being stopped or becoming more costly to produce. Also, challenges from regulations are getting worse as a result. Because environmental and social governance is growing, there is increasing pressure on tech companies to be clearer about their effects on the environment and how they handle taxes. To fit these fresh rules, it is necessary to make big changes in the software and tools for managing business. This makes things more complex, as they must also adjust to changing processes.

### Enterprise Risk Management (ERM)

In the past, as McShane et al. (2011) and Gordon et al. (2009) pointed out, risk management in companies was frequently divided and disordered. Managed risks in isolation of departments: Before, corporate risk managers dealt with specific and clear-cut risks. Financial dangers were managed by treasury departments through using derivatives for hedging purposes. This method that operates in separate groups brought about the compartmentalization of risk management efforts.

ERM came into existence to handle a range of dangers, not just those linked with finance. The objective of ERM is the coordinated management of all risk types like governance risk, auditing risk, supply chain and distribution system risks, IT risks as well as human resource related ones. It does not concentrate on isolating threats like TRM does; rather it focuses more on comprehending how they interact systematically.

ERM puts risks together in combined portfolios, helping to reduce residual risk better than when managing risks alone. Using portfolio theory, ERM has the possibility to improve the value of a firm because total risk in a combined portfolio is usually less than the addition of individual risks, particularly if these are not fully correlated and there exist natural hedges.

Additionally, Mikes and Kaplan (2013) stress that a good ERM system should be deeply linked to a firm's processes and operations. The quality of ERM is not only related to internal controls but also interacts with wider governance at firm level. As COSO (2004) highlights, the framework for ERM includes internal controls within it and places ERM in a larger context concerning firm-level controls. From McNally and Tophoff (2014) and Protiviti Inc. (2006), we can see that ERM is a part of governance where the risk management function falls under governance. The wide coverage of COSO framework, with its abstract nature, points out there would probably be significant diversity in how ERM gets applied among various firms.

### Impact of ERM on firm value

On the theoretical side, similar to how Horvey and Ankamah (2020) have synthesized, this study is also based on risk management theory as Sarkis described it in 1998, which involves examining the ways organizations and people obtain money and distribute funds for projects while taking into account their associated risk factor. The agency theory, which was explained by Smith and Stulz in 1985, plays an important role within this risk management model. It helps to understand how managing risks can affect managerial attitudes towards taking on risk or engaging in hedging activities by pointing out possible conflicts of interest between shareholders, managers and debt holders because of uneven earnings distribution among them. Excessive risk-taking or avoidance of productive ventures may result from such conflicts, as pointed out by Mayers and Smith (1987). The agency theory believes in managing risks to align the different motivations of managers and shareholders. It suggests that, even though shareholders might like high risks for bigger returns, managers usually want less risk and smaller returns. The theory promotes risk management as a method to balance these interests for better performance in organizations. It also states that ERM, functioning like a governance tool for monitoring managerial actions, helps to decrease the agency costs linked with risk management.

Furthermore, the research also revisits modern portfolio theory proposed by Markowitz in 1952. In this theory it is said that risk management does not automatically make value for shareholders because investors can independently diversify their investment risks. According to Markowitz, only systematic risks which are part of the market need to be managed as idiosyncratic risks - those unrelated with markets - do not affect diversified investors and managing them might result in a negative net present value (NPV). Yet, Beasley et al. (2008) reconsider this argument within the framework of market imperfections and inefficiencies present in reality. They state that these circumstances might support the added value of ERM. They propose that ERM is helpful in managing organizational portfolios and guiding managerial decisions, especially if we accept market imperfections and deficiencies.

The empirical research on ERM and its influence on firm value and performance in the past have presented mixed results concerning the effectiveness of ERM. However, most of them lean towards the angle that ERM is beneficial to companies. The variation in methods to measure ERM is noticeable.

At the beginning, studies like Liebenberg and Hoyt (2003) raised a question about ERM adoption by presenting appointment of Chief Risk Officer (CRO) as crucial evidence. They found that there is a tendency where companies having more leverage are likely to appoint CROs. Pagach and Warr (2011) explored further by discovering additional elements such as earnings instability and CEO payment tied to stock results that play a significant role in deciding whether someone should be named CRO.

In the study of McShane et al. (2011), they also examined ERM in relation to S&P rating system by sorting it into distinct levels. They discovered that there is a favorable link between ERM rating and firm value, but this connection only exists up to certain extent. This particular finding was especially illuminating in understanding how Traditional Risk Management (TRM) differs from more complex ERM methods.

For insurance industry, Hoyt and Liebenberg (2011) used Tobin’s Q as a measure for firm value. They found that there was an increase in value with ERM implementation which was positive but not very big. This finding supported their earlier finding from 2008 and made the positive link between ERM and firm value stronger.

However, studies such as Pagach and Warr (2010) bring a more skeptical viewpoint. They find minimal influence of ERM on firm performance and challenge the largely positive associations observed by other researchers.

The study of Beasley, Clune and Hermanson (2005) along with later studies from Beasley et al. (2008) highlight the variation in ERM benefits. They suggest that these advantages depend on particular features of a firm, like its size or the kind of industry it operates within.

International views bring complexity to the situation. For instance, Gonzalez et al. (2020) observed that the relationship between ERM and company value is not equally robust in Spanish firms, suggesting cultural and monetary disparities in the effectiveness of ERM strategies. This point is supported by research by Aebi et al. (2012) and Agustina and Baroroh (2016), which discovered reverse or non-significant links between ERM and performance in different geographical locations.

Gordon et al. (2009) highlights the importance of aligning ERM with firm-specific factors, underlining that aspects like environmental ambiguity and board supervision are vital for effective deployment of ERM.

Research in global settings also supports the positive results of ERM. Acharyya (2009) and Omasete (2014), for instance, discovered that risk management practices have a notable effect on the financial performance of insurance firms. These earlier studies display a general consensus that, while it is possible for ERM to be beneficial for company value and performance, its effectiveness relies heavily upon multiple factors such as specific firm characteristics; what kind of industry they are in; whether there are outside forces like regulations or how markets are currently behaving (Agarwal and Taffler, 2008).

### Research Question

Although much studying has been done about ERM, a void is present in its application to technology firms. This absence is notable as these companies function within an exceptional environment. Technology businesses are not just leading the way in terms of creativity, they also deal with numerous intricate and rapidly changing risks. These elements consist of technical obsoleteness, cybersecurity dangers, keen competition and a continuously changing regulatory scene. Dealing with these hardships requires a complicated approach to risk control that ERM is well poised for.

On the other hand, the effectiveness of ERM in this sector is not thoroughly examined. The present studies primarily focus on conventional areas such as finance and insurance where risk management procedures are already set up, resulting in a more recognized appreciation for ERM's impact. It may be possible that technology organizations, due to their dynamic and ever-changing nature, exhibit distinct patterns when it comes to adopting and utilizing ERM processes. Understanding the effect of ERM policies on value and performance of technology organizations is very important for many reasons. It can give us useful knowledge about how well ERM frameworks are adaptable and effective in dealing with different risks that technology companies face. Also, it can help technology companies improve their ways of managing risk to match better with the type of operation obstacles and market conditions they have. This research holds promise for improving the field of risk management by applying ERM ideas in an industry that is very important to the world economy but not yet explored much within ERM studies.

Therefore, this study aims to address this significant research void by trying to answer the question of “Does the quality of ERM increase the value of Tech companies?". The research will specifically investigate the potential positive correlation between the integration and efficacy of ERM techniques in technology organizations and their market value. The study attempts to give empirical data by focusing on technology firms listed on the London Stock Exchange. This research not only seeks to enhance the existing literature on ERM but also strives to provide practical insights for managers and policymakers in the technology sector. The anticipated result of this research is expected to make a substantial contribution by improving our comprehension of the role of ERM in a crucial sector of the contemporary economy. Additionally, it has the potential to influence the strategy of technology businesses towards risk management in a world that is becoming progressively intricate and linked.

## III. Empirical Analysis

### Empirical Models and Sample

The investigation focuses on determining the influence of ERM practices on the valuation of technology firms listed in the UK, employing the Ordinary Least Square (OLS) regression model outlined below:

TOBIN’S Qi = β0 + β1 ERMIi + β2SIZEi + β3LEVERAGEi + β4ROAi + β5DIVIDENDi + β6INT\_DIVi + εi

The model has been used by Pan et al (2022) to investigate whether ERM benefit performance of manufacturing firms; other research like Horvey and Ankamah’s (2020) also used models that are quite similar. The selected sample are 100 technology companies listed on FTSE All-share and FTSE AIM All-share throughout the period from fiscal year 2021 to fiscal year 2022. The sample includes even the companies that have already gone private, merged or been acquired, or been out of business since after the fiscal year 2022. The necessary data was collected from the FAME database, Bloomberg database and each company’s own financial report.

### Variables Explaination

a. Dependent variable.

This paper’s dependent variable to measure the valuation of firms is Tobin’s Q, which is calculated as a firm’s market capitalization as of the end of the fiscal year divided by its total assets, as it is one of the most frequently used indicators of firms' value. Tobin's Q serves as a gauge of investor sentiment regarding a company's future prospects. A higher Q indicates that investors hold a positive view of the company's competitive advantage and anticipate healthy returns. This measurement has been applied by several past research about the relationship between Enterprise Risk Management and firms' value/performance (Horvey and Ankamah, 2020; Pan *et al.*, 2022; McShane, Nair and Rustambekov, 2011). For normality reasons, the variable has been log-transformed.

b. Independent variable: Enterprise Risk Management Index (ERMI).

To investigate the effect of ERM on firms' value, past researchers have utilized several different benchmarks to measure ERM. Overall, the majority of measurements mainly fall into two categories. Firstly, are measurements in the form of binary variables, for example, it can be whether or not the company implemented ERM (Pan et al, 2022; Bertinetti et al, 2013, Hoyt and Liebenberg, 2011), or a proxy like the hiring of senior executive overseeing risk manage process (Chief Risk Officer) as used in papers by Beasley et al.(2008) or Pagach and Warr (2010). Despite being widely utilized by researchers; this type of variable suffers from certain disadvantages. As discussed by Pan et al. (2022), this approach does not demonstrate the actual quality of the ERM framework implemented in a company. In addition, collecting implicit evidence related to the adoption of ERM can be complex as normally, company engagement reporting is not mandatory, thus researchers could be forced to collect indirect sights of ERM instead (Bertinetti et al, 2022). On the other hand, the second popular category of benchmark includes quantitative variables which assess the quality of firms’ ERM programs based on several aspects, for instance, the ERM Index synthesized by Gordon et al.(2009) on the basis of the four ERM targets (strategies, operations, reporting, and compliance) by COSO (2004), which is also applied in other papers like Pan et al (2022) and Malik et al (2019), or the index which combines factors including title of the risk manager, ERM adoption, Risk management committee, risk department, BOD independence, Auditor type and risk plan by Horvey and Ankamah (2020). This study gravitates towards discovering how the variation in effectiveness of ERM systems impacts their firm's value, hence the second approach to ERM is chosen. Moreover, this paper will be built around the ERM Index by Gordon et al. (2009) under its alignment with the four targets in COSO’s guidance to the ERM framework. Specifically, each target is represented by 2 indices, and the cumulative sum of the indices from all 4 targets, totaling 8 indices, forms the ERM index:

***ERMI = Σ(2,k=1)Strategy+ Σ(2,k=1)Operation+Σ(2,k=1)Reportingk +Σ(2,k=1)Compliance***

Each of the component is calculated as:

|  |  |  |
| --- | --- | --- |
| ERMI Components | Sub-component | Detail |
| Strategy | Strategy1 = | Sales is the amount of sales that the company recorded for its fiscal year 2022; µ is the industry average for sales that year; and σ is the industry variation for sales that year. |
| Strategy2 = | ∆β symbolizes the alteration in systemic risk β for the firm between fiscal year 2022 and 2021, µ∆β signifies average yearly change in systemic risk β for 2022 across industry and σµ∆β represents variance within industry's change of systemic risk β also for this same year. |
| Operations | *Operations1 =* | Sales represents the sales volume of the firm  in fiscal year 2022, Total Assets is the total assets of the  firm in that same year. |
| *Operations2 =* | Sales represents the sales volume of the firm  in fiscal year 2022, Employee is the total number of employees the firm has in that same year. |
| Reporting | *Reporting1 = Material Weakness + Auditor Opinion + Restatement* | Material Weakness implies a material weakness in the financial statements of the firm for fiscal year 2022, Auditor Opinion relates to the evaluations made by qualified auditors on the company's financial statements in 2022, and Restatement indicates if there was any restatement of financial statements during year 2022. The three items can be assigned values -1 or 0. |
| *Reporting2 =* | Normal Accruals represents the normal accruals for the firm in fiscal year 2022 while Abnormal Accruals is the opposite for that firm in the same year. |
| Compliance | *Compliance1 =* | Auditor Fees represents how much the firm spent on auditors in fiscal year 2022, Total Assets is that firm’s total assets value in 2022. |
| Compliance2 = | Settlement Net Gain represents how much the firm netted from legal settlement in fiscal year 2022, Total Assets is that firm’s total assets value in 2022. |

**Table 1:** ERMI Construction (Gordon et al., 2009)

Like the dependent variable, the ERM Index used to run models in this paper is also the log-transformed version to normalize the distribution of data.

c. Control variables

The first control variable applied in this study is the size of the firm (*SIZE*). As a company grows, the events impacting it naturally change. Thus, it is crucial to account for company size in this research, which is measured by the natural logarithm of total assets. Moreover, bigger companies can utilize more resources for execution Horvey and Ankamah (2020). Some research, including Beasley et al. (2008) and McShane (2011), suggest that larger organizations tend to achieve better performance. On the other hand, Hoyt and Liebenberg (2011) and Lang and Stulz (1993) found the inverse relationship between the scale of a firm and its valuation, which is backed by Bertinetti et al. (013), while the study by Pan et al. (2022) implied that there was no particularly significant relationship between the two.

The second factor this paper wants to include is the companies’ financial performance, or Profitability, represented by the Return on Asset (*ROA*) ratio. When a firm has a high ROA, it typically means the firm is generating more income per dollar of assets, which can lead to higher investor confidence and, consequently, a higher market valuation of the firm. Investors are likely to pay more for shares of a company that can use its assets more efficiently than its competitors, as this ability can lead to higher profitability and potentially higher dividends or reinvestment into growth opportunities (Patin, Rahman and Mustafa, 2020). Furthermore, a higher ROA can also indicate that a company has a competitive advantage in its industry, such as superior technology, brand, or business model, which can contribute to a higher firm value. The positive relationship between Profitability and firm value has been proven by several papers (McShane et al., 2011; Bertinetti et al., 2023; Florio and Leoni, 2016) and this study expects to have the same result.

Another factor to be taken into account is Leverage (*Gearing*), which controls the ambiguous relationship between capital structure and market evaluation (Florio and Leoni, 2016). Jensen (1986) suggests that by reducing the free cash flow that could be spent by managers on suboptimal projects, financial leverage can contribute to the enhancement of a firm's value. Nevertheless, an overabundance of leverage may elevate bankruptcy risks, resulting in financial distress costs for the owners (Horvey and Ankamah, 2020). Siahaan (2013) underscored the unresolved debate on leverage's effect on firm value, with positive impacts identified by Cheng and Tzeng (2009), and Jihadi *et al.*,( 2021), versus the negative effects reported by Baxter *et al.* (2013), Kaviani, Biabani and Soleimani (2012), or Fosu et al. (2016). Leverage level is represented by the Gearing ratio (total debt/total equity).

This paper also takes the Growth opportunities (*Growth*) of the business into consideration, which is calculated as the percentage of change in Sales in comparison to the previous year. The inclusion of this variable is in line with studies by Baxter *et al.*( 2013), McShane, Nair and Rustambekov (2011), Pan *et al.*, (2022) and Bailey (2019), which all find negative relationships, except the research by Pan et al.

The element of whether the company has an international business (*div\_int*) is also included, as Pan et al. (2022) demonstrated that the existence of international business positively impacts firm value and even though the relationship is insignificant, ERM plays a significant role in enhancing firm value within firms engaged in international business . Conversely, for firms that do not participate in international business, the influence of ERM on firm value does not show statistical significance. Conducting business internationally is likely to complicate managerial coordination efforts and diminish operational efficiency, as suggested by Laeven and Levine (2007). Ai et al. (2018) also emphasized that the complexity inherent in the risks encountered significantly impacts the outcomes of risk management strategies.

Finally, this paper factors in the variables *Dividend*, coded as a dummy variable (1 for companies that disbursed dividends in the year under review and 0 for those that did not), and *Beta*, indicating the relative volatility of the company’s stock. Their influence on Tobin’s Q is complex for dividends, where it could signal either the absence of attractive new projects or a financially healthy company capable of distributing profits; in contrast, a high Beta, indicative of higher volatility, is generally viewed as augmenting the value of investments (Horvey and Ankamah, 2020)

### 3. Descriptive Statistics and Diagnostic

a. Descriptive Statistics

This section reports summary statistics on the main variables of the models tested by this paper.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Obs** | **Mean** | **Std. dev.** | **Min** | **Max** |
| TobinsQ | 100 | 2.207691 | 1.95328 | 0.18 | 11.19 |
| ERMI | 100 | 219.6582 | 223.4233 | 18.78448 | 1412.018 |
| SIZE | 100 | 5.021386 | 0.7382557 | 3.57967 | 6.878299 |
| ROA | 100 | -4.06459 | 29.04625 | -132.23 | 44.3 |
| Gearing | 100 | 0.4487405 | 0.7997895 | 0.011 | 5.9454 |
| Growth | 100 | 0.2864465 | 0.4779576 | 0.4214337 | 2.732991 |
| Beta | 100 | 0.7825119 | 0.7842242 | -3.7642 | 3.34 |
| Dividend | 100 | 0.51 | 0.5024184 | 0 | 1 |
| div\_int | 100 | 0.91 | 0.2876235 | 0 | 1 |

**Table 2:** Descriptive Statistics.

Our analysis shows that, on average, the technology firms we have selected carry an overvaluation, with a mean Q value of 2.208, indicating high investor optimism regarding their progress (Pan et al., 2022). The mean of the ERM Index (after being log-transformed) is 5.095 and the SIZE is 5.021.

The histogram Graph 1 (see Appendix 1) illustrates the distribution of ROA among a selection of companies, revealing a slight leftward skew with the bulk of the data congregating near zero but with a tendency towards the negative side. The mean ROA of -4.064 suggests that, on average, companies are experiencing a minor negative return on their assets. Additionally, the substantial standard deviation of 29.046 indicates a wide variation in the ROA values within the sample, highlighting that while some companies perform around the average, others have significantly higher or lower returns, including some extreme negative cases. On average, the gearing ratio of tech companies is 0.448, or around 45%. However, like ROA, this variable also suffers from high disparity, outliers and skewness (as illustrated in Graph 2, appendix 2).

On average, the selected tech companies grew 28.64% in sales in comparison to the previous year while the mean of Beta is 0.782.

The mean of Dividend is 0.51, indicating that on average 51% of the observations paid dividends in the fiscal year 2022. The percentage of companies with international business is 91%.

Normalization will be applied to variables that require.

b. Correlation matrix and diagnostic test.

Table 3 represents the Pearson correlation coefficients of the chosen variables.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **LogTobinQ** | **LogERMI Index** | **LogSIZE** | **LogROA** | **LogGearing** | **LogGrowth Rate** | **Dividend or not** | **International Business** | **LogBeta 2022** |
| **LogTobinQ** | **1** |  |  |  |  |  |  |  |  |
| **LogERMI Index** | **0.077** | **1** |  |  |  |  |  |  |  |
| **LogSIZE** | **-0.13** | **0.37** | **1** |  |  |  |  |  |  |
| **LogROA** | **0.51** | **0.24** | **0.18** | **1** |  |  |  |  |  |
| **LogGearing** | **-0.3** | **-0.042** | **0.06** | **-0.32** | **1** |  |  |  |  |
| **LogGrowth Rate** | **0.17** | **0.22** | **-0.1** | **-0.1** | **0.26** | **1** |  |  |  |
| **Dividend or not** | **0.12** | **0.27** | **0.46** | **0.52** | **-0.16** | **-0.27** | **1** |  |  |
| **International Business** | **-0.11** | **0.042** | **0.13** | **0.076** | **0.15** | **-0.23** | **0.12** | **1** |  |
| **Log Beta 2022** | **-0.11** | **-0.086** | **-0.13** | **-0.13** | **0.13** | **-0.044** | **-0.14** | **0.12** | **1** |

**Table 3:** Correlation matrix.

The result shows that there is no particularly high correlation between any two independent variables (all are between -0.5 to 0.5), indicating no presence of multicollinearity. As such, the variables chosen for inclusion in the regression analysis are deemed suitable, as demonstrated by the variance inflation factor (VIF), developed by Belsley, Kuh, and Welsch (1980) as presented in Table 4 (see appendix 3). These values, which lie between 1 and 2 with an average VIF of 1.37, indicate a moderate level of correlation among the independent variables, insufficient to require any adjustments.

This paper also uses the Breusch–Pagan test for heteroskedasticity and the Shapiro-Wilk test for normality in order to guarantee the variables satisfy the assumptions of OLS. Results indicate that while the residuals from the regression model exhibit characteristics consistent with a normal distribution, there is evidence of heteroskedasticity in the model and to address this problem, this paper will use robust standard errors, which adjust the standard errors of the coefficients to account for heteroskedasticity.

### 4. Empirical Result

Subsequently, the analysis progresses to an examination of multivariate tests, the outcomes of which are delineated in Table 5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Exp Sign** | **lnTobinQ(1)** | **lnTobinQ(2)** | **lnTobinQ(3)** | **lnTobinQ(4)** | **lnTobinQ(5)** | **lnTobinQ(6)** | **lnTobinQ(7)** | **lnTobinQ(8)** |
| **Log ERMI** | (+) | 0.061 | 0.014 | 0.06 | 0.01 | 0.01 | 0.013 | -0.0048 | 0.005 |
|  |  | (0.782) | (0.18) | (0.778) | (0.172) | (0.135) | (0.16) | (-0.06) | -0.06 |
| **Log ROA** | (+) |  | 1.19\* | 1.712\*\* | 1.882\*\*\* | 1.88\*\*\* | 1.92\*\*\* | 1.557\*\* | 1.7656\*\*\* |
|  |  |  | (1.806) | (2.568) | (2.936) | (2.892) | (2.9) | (2.3) | (-2.65) |
| **Log SIZE** | (+/-) |  |  | -1.284\*\*\* | -1.174\*\* | -1.17\*\* | -1.22\*\* | -1.60\*\*\* | -1.6\*\*\* |
|  |  |  |  | (-2.682) | (-2.609) | (-2.567) | (-2.56) | (-3.23) | (-3.28) |
| **Log Growth** | (+/-) |  |  |  | 0.421\*\* | 0.421\*\* | 0.424\*\* | 0.55\*\*\* | 0.49\*\* |
|  |  |  |  |  | (1.839) | (2.053) | (2.05) | (2.63) | (-2.35) |
| **Log Gearing** | (+/-) |  |  |  |  | -1.86\*\*\* | -1.858\*\*\* | -1.63\*\* | -1.373\*\* |
|  |  |  |  |  |  | (-2.755) | (-2.72) | (-2.43) | (-2.03) |
| **Log Beta** | (+) |  |  |  |  |  | 0.055 | 0.12 | 1.11 |
|  |  |  |  |  |  |  | (0.37) | (0.84) | (-0.27) |
| **Dividend** | (+/-) |  |  |  |  |  |  | 0.27\*\* | 0.27\*\* |
|  |  |  |  |  |  |  |  | (2.23) | (-2.29) |
| **International Business** | (+) |  |  |  |  |  |  |  | -0.365 |
|  |  |  |  |  |  |  |  |  | (-2.04) |
| **\_cons** |  | 0.717 | 0.296 | 2.067 | 2.066 | 2.066 | 2.083 | 2.856 | 2.989 |
|  |  | (1.766) | (0.639) | (2.589) | (2.544) | (2.714) | (2.718) | 3.46 | -3.675 |
| **N** |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **R-Squared (adj)** |  | 0.007 | 0.020 | 0.082 | 0.106 | 0.168 | 0.159 | 0.3061 | 0.225 |
| **Prob > F** |  | 0.436 | 0.149 | 0.0132 | 0.007 | 0.001 | 0.001 | 0 | 0.0001 |

* **\*p<0.05, \*\*p<0.01, \*\*\*p<0.001**
* **t-statistics in parenthesis**

**Table 5:** Regression Result.

The control variables are gradually added to the OLS regression model, with Model 8 as the one with the full list of chosen variables, to explore the association between Enterprise Risk Management quality and firm value. In regression Model 1, a positive but statistically extremely insignificant correlation is observed between ERM Index and firm value, evidenced by a t-value of 0.782. This model exclusively incorporates the ERM Index as the regressor, yielding an R^2 of just 0.007. The introduction of control variables from Model 2 to Model 6 results in quite consistent conclusions about the relationship between ERMI and Tobin’s Q, in both the positive and the insignificant nature. However, when the variable Dividend is introduced, the relationship between ERM and firm values turns negative, as observed in Model 7, however, turned positive again after the element of International Business is introduced in Model 8. To verify this result, a model with every variable except for Dividends, a model with only significant variables from Model 8 and a Model with only ERMI and Dividends have been deployed and they indicate that the appearance of Dividends inconsistently switches the direction of the relationship.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Log TobinQ** | **Log TobinQ** | **Log TobinQ** |
| Log ERMI | 0.023  (0.286) | -0.0086  (-0.108) | 0.0347  (0.437) |
| **Dividends** |  | 0.2479\*\*  (2.106) | 0.1611  (1.473) |
| **Log ROA** | 2.132\*\*\*  (3.228)- | 1.5009\*\*  (2.260) |  |
| **Log SIZE** | -1.2105\*\*\*  (-2.587) | -1.4785\*\*\*  (-3.136) |  |
| **Log Growth** | 0.3612\*  (1.758) | 0.5355\*\*  (2.569) |  |
| Log Gearing | -1.56\*\*  (-2.34) | -1.6702\*\*  (-2.489) |  |
| **Log Beta** | 0.092  (0.63) |  |  |
|  |  |  |  |
| **International Business** | -0.362  (-1.98) |  |  |
| \_cons | 2.209\*\*\*  (2.92) | 2.7582\*\*\*  (3.380) | 0.7652\*  (1.89) |
| **N** | **100** | **100** | **100** |

* **\*p<0.05, \*\*p<0.01, \*\*\*p<0.001**
* **t-statistics in parenthesis**

**Table 6:** Regression Model without Dividend.

However, the insignificant nature between the two does not change. This suggests that overall, the quality of ERM programs does not influence the value of listed tech firms in the UK.

In terms of the positive correlation, this is in line with various previous studies regarding the link between ERM quality and valuation of firms (Horvey and Ankamah, 2020; McShane, Nair, and Rustambekov, 2011; Pan et al., 2022; Florio and Leoni, 2017; Baxter et al., 2013). However, unlike these studies, which agreed that there was a significant tie between the two, with typically 1% and 5% significance levels, this paper’s opposite finding is a standout. The switch to a negative sign also contradicts these studies.

Unlike the ERM Index, the results for the control variables stay consistent throughout the models, and they are as follows. The impacts of ROA and Beta on Tobin’s Q align with this paper’s earlier expectation, as both affect Q positively, although only the former’s impact is significant. The scope of the company (SIZE) and its level of Leverage have negative and significant relationship to the dependent variable, which is the similar finding to Baxter *et al.* (2013), Kaviani, Biabani and Soleimani (2012), Fosu et al. (2016), Hoyt and Liebenberg (2011), Lang and Stulz (1993) and Bertinetti et al. (2013). On the other hand, the Growth opportunities of a business have a positive and significant relationship with its value.

Dividend also shows significance in the regression analyses, inline with the Pearson correlation analysis indicates that Dividend is part of a group that has a stronger correlation with Tobin's Q and ERM rating.

Similar to Pan et al. (2002) study, whether or not a company has an international business is not significant to its value. However, this paper’s models indicate a negative correlation instead of a positive one. Continue to follow Pan et al., this paper tests, if firms’ engagement in foreign markets impacts the extent to which ERM quality affects Tobin’s Q. Table 7, presents that, unlike their finding, this variable does not change the insignificance of the ERM Index.

|  |  |  |
| --- | --- | --- |
| **Variables** | **lnTobinQ (div\_int = 1)** | **lnTobinQ (div\_int = 0)** |
| **Log ERMI** | **-0.0390** | **-0.165** |
|  | **(-0.28)** | **(-0.38)** |
| **N** | **91** | **9** |

* **\*p<0.05, \*\*p<0.01, \*\*\*p<0.001**
* **t-statistics in parenthesis**

**Table 7:** ERMI significance with and without international business.

However, as up to 91% of observations have a foreign business, it might likely introduce bias in the regression result.

### 5. Discussion

While this study suggests a statistically insignificant impact of Enterprise Risk Management practices on UK listed technological firms’ value, this result appears to diverge from the conclusions of several other key studies in this domain. This is a discovery that is dissimilar with the research conducted by Hoyt (2006), Bertinetti (2013), Pan et al. (2022), McShane, Nair and Rustambekov (2011), Florio and Leoni (2017) , Baxter et al. (2013) or Gordon et al.(2009), which all previously found that there is a significant relationship between both. The switch between negative and positive correlation between the two when whether or not the company pays dividend is also not observed in any of these studies. In terms of this insignificance between ERM and firms’ value, this result is similar to Pagach and Warr (2010), Tahir and Razali (2011), Skerci (2013) and Agustina and Baroroh (2016). However, these are studies that examine the impact of ERM implementations instead of the actual quality of the ERM programs. There are some factors that might explain this result. The analysis by Gordon al. (2009) suggested that the impact of ERM on firm performance can be contingent on various factors, highlighting the complexity of the relationship between ERM and firm performance. This contingent perspective suggests that the benefits of ERM may not be uniformly realized across all types of companies, including those in the technology sector. Moreover, the tech industry moves fast, and companies need to be adaptable to stay ahead. A robust ERM program can introduce layers of bureaucracy that slow down decision-making. While an effective ERM framework is still essential in these companies, this could be a disadvantage if a competitor can react quicker to a new market opportunity. Some ERM programs can become overly focused on ticking compliance boxes rather than proactively identifying and mitigating emerging risks specific to the tech industry. This focus on meeting regulations may not translate to addressing the unique new threats faced by a fast-moving tech company. Finally, the ERM Index by Gordon et al. (2009) might be a flawed benchmark to measure risk management in tech companies, as stated by the creators that while it is a reasonable one, it is also not perfect.

## IV. Conclusion

The role of risk management is now very important for CEOs, driven by complex and uncertain organizational environments. Companies used to handle risks in separate areas, for example dealing with financial risk like the hedging of derivatives and its effect on firm value. But this narrower view of past research has made broader parts less investigated. In reaction to these difficulties, many companies are moving from old-style risk management systems to Enterprise Risk Management (ERM) that provides a more all-encompassing method of handling risk throughout an organization. ERM is gaining popularity but investigation on its influence toward firm value has been restricted because it's not easy to measure the use and abilities of ERM accurately, as emphasized by McShane et al. (2011). For bridging this missing part, the paper makes use of ERM index made by Gordon et al. (2009), which is very similar to the four goals of ERM described by Committee of Sponsoring Organizations, which gives a stronger tool for checking how well ERM works and its effect on increasing value for firms. Previous researchers have found mixed results concerning whether or not ERM lead to better financial performance, however most leaning towards a positive relationship. The drought of pre-existing literature which examinates ERM’s impact is even more considerable for companies from nonfinancial sectors, more specifically technological companies, which have been shaping the global scenery, especially since the start of the 21st century. These companies are not only prone to the common risks like financial risks, compliance risks or operational risks, but they also are vulnerable against more unique ones like cybersecurity or the turbulence from rapid technological changes. That is the gap that this paper tries to bridge.

Using an ordinary least square regression analysis and a sample of 100 technology firms listed on the London Stock Exchange in the fiscal year 2022, it was found that the relationship between ERM and firm value (measured by Tobin's Q) among these companies - although generally positive as many previous literatures suggested - is not statistically significant. This outcome remained consistent even with more control variables included, implying that within the technology sector, the effectiveness of ERM programs does not have a strong impact on company valuation. Interestingly enough, when we took into account whether a company distributed dividends or not, the correlation between ERMI and firm value shifted from positive to negative. This change, not seen in any literature before, suggests a possible connection between ERM tactics and dividend methods that needs more study. There might be several reasons why we did not find a substantial connection between ERM quality and firm value. The idea of contingency proposed by Gordon et al. (2009) highlights that every firm does not gain benefits from ERM in the same manner. For example, tech companies require to remain nimble and if ERM frameworks turn too bureaucratic, they could possibly decelerate quick decision-making. This can lower the effectiveness of such firms in this aspect. Also, there is a chance that some ERM programs focus more on following rules rather than spotting and reducing new risks that are about to occur. The ERMI structure possibly does not fully cover the intricacies of risk management in technology businesses. This study did not find a statistically important link between ERM quality and firm value in technology companies. It is crucial to understand that this does not mean ERM quality should be ignored, as dealing with risk has always been key for any company's existence. While it may not show up right away in the value of a company, making better quality ERM is an important part of overall business strategy when we think about changing risks that are specific to each sector.

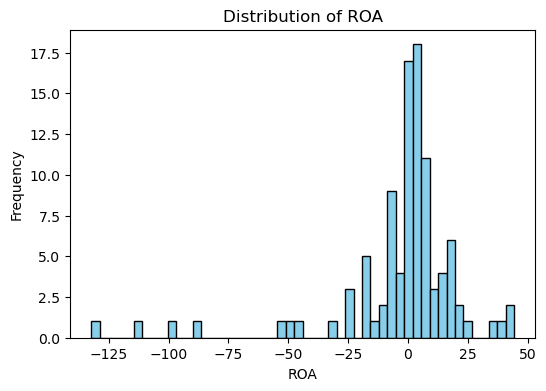
Limitations exist within this study. Initially, restricted by time and resources constraints, the sample size comprises solely 100 corporations at one time. Although conducive to statistical examination, it may fail to encapsulate the full scope of diversity and fluctuation present in the technology industry, encompassing companies of varying magnitude, stages of advancement, and market segments. A panel regression comprising a larger number of variables over an extended duration could potentially offer a more impartial perspective. The study's concentration on technology firms listed on the LSE restricts the generalizability of its results to other technology companies in varying regions or nations, including privately owned businesses. Factors like regulatory environments, market patterns, and cultural differences can greatly impact the effectiveness and relevance of ERM. Furthermore, as already mentioned, the study uses the ERM Index to measure ERM quality. Although this is a systematic method but there might be some elements related to ERM quality which are not fully covered by index or implementation subtleties in technology firms. The ERMI may also not reflect sector-specific risks adequately. In order to advance current knowledge, it is imperative for future studies to refine the ERMI framework or create novel measures that accurately encompass industry-specific risks. Moreover, gaining qualitative insights into how technology enterprises strike a balance between ERM and agility could yield valuable strategic recommendations. With the ever-changing landscape of the technology sector, a more intricate comprehension of ERM practices is essential for bolstering organizational resilience and value. Researchers in the future should consider refining the ERMI framework or developing new measures that capture industry-specific risks more effectively. Furthermore, qualitative insights into how tech firms balance ERM with agility could offer valuable strategic recommendations. With the continual evolution of the tech sector, gaining a more nuanced understanding of ERM practices will be crucial for enhancing firm resilience and value.

## References

1. Acharyya (2009) The influence of enterprise risk management on insurers’ stock market performance: An event analysis. *International Journal of Business and Management Invention* [online]. 44 (3), pp. 121–136. Available from: https://www.soa.org/globalassets/assets/files/resources/essays-monographs/2009-erm-symposium/mono-2009-m-as09-1-acharyya.pdf.
2. Aebi, V., Sabato, G. and Schmid, M. (2012a) Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance* [online]. 36 (12), pp. 3213–3226. Available from: https://doi.org/10.1016/j.jbankfin.2011.10.020.
3. Aebi, V., Sabato, G. and Schmid, M. (2012b) Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance* [online]. 36 (12), pp. 3213–3226. Available from: https://doi.org/10.1016/j.jbankfin.2011.10.020.
4. Ai, J., Bajtelsmit, V.L. and Wang, T. (2016) The combined effect of enterprise risk management and diversification on property and casualty insurer performance. *Journal of Risk and Insurance* [online]. 85 (2), pp. 513–543. Available from: https://doi.org/10.1111/jori.12166.
5. Bailey, C. (2019) The relationship between Chief Risk officer expertise, ERM quality, and firm performance. *Journal of Accounting, Auditing & Finance* [online]. 37 (1), pp. 205–228. Available from: https://doi.org/10.1177/0148558x19850424.
6. Baxter, R.J., Bedard, J.C., Hoitash, R. and Yezegel, A. (2013) Enterprise Risk Management Program Quality: Determinants, value Relevance, and the Financial Crisis. *Contemporary Accounting Research* [online]. 30 (4), pp. 1264–1295. Available from: https://doi.org/10.1111/j.1911-3846.2012.01194.x.
7. Beasley, M.S., Clune, R. and Hermanson, D.R. (2005) Enterprise risk management: An empirical analysis of factors associated with the extent of implementation. *Journal of Accounting and Public Policy* [online]. 24 (6), pp. 521–531. Available from: https://doi.org/10.1016/j.jaccpubpol.2005.10.001.
8. Beasley, M.S., Pagach, D.P. and Warr, R.S. (2008) Information conveyed in hiring announcements of senior executives overseeing Enterprise-Wide risk management processes. *Journal of Accounting, Auditing & Finance* [online]. 23 (3), pp. 311–332. Available from: https://doi.org/10.1177/0148558x0802300303.
9. Bhagat, S. and Black, B.S. (2002) The Non-Correlation between board independence and Long-Term firm performance. *The Journal of Corporation Law* [online]. 27 (2), pp. 231–274. Available from: https://www.questia.com/library/journal/1P3-128916471/the-non-correlation-between-board-independence-and.
10. Bharadwaj, A., Bharadwaj, S.G. and Konsynski, B.R. (1999) Information Technology Effects on Firm Performance as Measured by Tobin’s q. *Management Science* [online]. 45 (7), pp. 1008–1024. Available from: https://doi.org/10.1287/mnsc.45.7.1008.
11. Cheng, M.-C. and Tzeng, Z.-C. (2011) The effect of leverage on firm value and how the firm financial quality influence on this effect. *Journal of Finance and Economics* [online]. 4 (7), pp. 89–104. Available from: http://www.wbiaus.org/3.%20Ming.pdf.
12. Committee of Sponsoring Organisations of the Treadway Commission [COSO] (2004) *Enterprise Risk Management : Integrated Framework* [online]. American Institute of Certified Public Accountants (AICPA) Historical Collection. Available from: https://egrove.olemiss.edu/cgi/viewcontent.cgi?article=1037&context=aicpa\_assoc.
13. Deloitte (2019) *2019 Technology Industry Outlook* [online]. Deloitte. Available from: https://www2.deloitte.com/ch/en/pages/technology-media-and-telecommunications/articles/technology-industry-outlook.html [Accessed 20 November 2023].
14. Deloitte (2023) *2023 Technology Industry Outlook* *Deloitte* [online]. Deloitte. Available from: https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/technology-industry-outlook.html [Accessed 20 November 2023].
15. Florio, C. and Leoni, G. (2017) Enterprise risk management and firm performance: The Italian case. *The British Accounting Review* [online]. 49 (1), pp. 56–74. Available from: https://doi.org/10.1016/j.bar.2016.08.003.
16. Fosu, S., Danso, A., Ahmad, W. and Coffie, W. (2016) Information asymmetry, leverage and firm value: Do crisis and growth matter? *International Review of Financial Analysis* [online]. 46, pp. 140–150. Available from: https://doi.org/10.1016/j.irfa.2016.05.002.
17. González, L.O., Santomil, P.D. and Herrera, A.T. (2020) The effect of Enterprise Risk Management on the risk and the performance of Spanish listed companies. *European Research on Management and Business Economics* [online]. 26 (3), pp. 111–120. Available from: https://doi.org/10.1016/j.iedeen.2020.08.002.
18. Gordon, L.A., Loeb, M.P. and Tseng, C.-H. (2009) Enterprise risk management and firm performance: A contingency perspective. *Journal of Accounting and Public Policy* [online]. 28 (4), pp. 301–327. Available from: https://doi.org/10.1016/j.jaccpubpol.2009.06.006.
19. Horvey, S.S. and Ankamah, J. (2020) Enterprise risk management and firm performance: Empirical evidence from Ghana equity market. *Cogent Economics & Finance* [online]. 8 (1), p. 1840102. Available from: https://doi.org/10.1080/23322039.2020.1840102.
20. Hoyt, R. and Liebenberg, A.P. (2011) The Value of Enterprise Risk Management. *Journal of Risk and Insurance* [online]. 78 (4), pp. 795–822. Available from: https://doi.org/10.1111/j.1539-6975.2011.01413.x.
21. Jihadi, M., Vilantika, E., Hashemi, S.M., Arifin, Z., Bachtiar, Y. and Sholichah, F. (2021) The Effect of Liquidity, Leverage, and Profitability on Firm Value: Empirical Evidence from Indonesia. *Journal of Asian Finance, Economics and Business* [online]. 8 (3), pp. 423–431. Available from: https://www.koreascience.kr:443/article/JAKO202106438543370.pdf.
22. Kaviani, M., Biabani, S. and Soleimani, A. (2012) STUDY OF AND EXPLAIN THE RELATIONSHIP BETWEEN THE FINANCIAL LEVERAGE AND NEW PERFORMANCE METRICS (EVA, MVA, REVA, SVA, CVA). *Journal of Risk  and Diversification* [online]. (4), pp. 10–16. Available from: https://www.sid.ir/En/Journal/ViewPaper.aspx?ID=365639.
23. Kumah, P. and Sare, A. (2013) Risk Management Practices among Commercial Banks in Ghana. *European Journal of Business and Management* [online]. 5, pp. 185–191. Available from: https://www.semanticscholar.org/paper/Risk-Management-Practices-among-Commercial-Banks-in-Kumah-Sare/02ce37cc7b2a76e9f3be2771890cd20dbec9a885.
24. Laeven, L. and Levine, R. (2007) Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* [online]. 85 (2), pp. 331–367. Available from: https://doi.org/10.1016/j.jfineco.2005.06.001.
25. Liebenberg, A.P. and Hoyt, R. (2003) The Determinants of Enterprise Risk Management: Evidence from the Appointment of Chief Risk Officers. *Social Science Research Network* [online]. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=416197.
26. Markowitz, H.M. (1952) PORTFOLIO SELECTION\*. *˜the œJournal of Finance/˜the œJournal of Finance* [online]. 7 (1), pp. 77–91. Available from: https://doi.org/10.1111/j.1540-6261.1952.tb01525.x.
27. Mason, C. and Harrison, R. (2004) Improving access to early stage venture capital in regional economies: A new approach to investment readiness. *Local Economy* [online]. 19 (2), pp. 159–173. Available from: https://doi.org/10.1080/0269094042000203090.
28. Mayers, D. and Smith, C.W. (1987) Corporate insurance and the underinvestment problem. *˜the œJournal of Risk and Insurance* [online]. 54 (1), p. 45. Available from: https://doi.org/10.2307/252881.
29. McNally, J. and Tophoff, V. (2014) Leveraging effective risk management and internal control. *Strategic Finance*. pp. 29–36.
30. McShane, M.K., Nair, A. and Rustambekov, E. (2011) Does enterprise risk management increase firm value? *Journal of Accounting, Auditing & Finance* [online]. 26 (4), pp. 641–658. Available from: https://doi.org/10.1177/0148558x11409160.
31. Mikes, A. and Kaplan, R.S. (2013) Managing Risks: towards a contingency theory of enterprise risk management. *Social Science Research Network* [online]. Available from: https://doi.org/10.2139/ssrn.2311293.
32. Oyewo, B. (2021) Enterprise risk management and sustainability of banks performance. *Journal of Accounting in Emerging Economies* [online]. 12 (2), pp. 318–344. Available from: https://doi.org/10.1108/jaee-10-2020-0278.
33. Pagach, D.P. and Warr, R.S. (2011) The characteristics of firms that hire chief risk officers. *Journal of Risk and Insurance* [online]. 78 (1), pp. 185–211. Available from: https://doi.org/10.1111/j.1539-6975.2010.01378.x.
34. Pagach, D.P. and Warr, R.S. (2010) The effects of enterprise risk management on firm performance. *Social Science Research Network* [online]. Available from: https://doi.org/10.2139/ssrn.1155218.
35. Pan, G., Zheng, L., Geng, Z. and Liu, M. (2022) Does enterprise risk management benefit manufacturing firms? Evidence from China. *Ekonomska Istrazivanja-economic Research* [online]. 36 (2). Available from: https://doi.org/10.1080/1331677x.2022.2134906.
36. Patin, J.-C., Rahman, A. and Mustafa, M. (2020) Impact of total asset turnover ratios on equity returns: Dynamic panel data analyses. *Journal of Accounting-Business Dan Management* [online]. 27 (1), p. 19. Available from: https://doi.org/10.31966/jabminternational.v27i1.559.
37. Protiviti Inc. (2006) *Guide to Enterprise Risk Management FREQUENTLY ASKED QUESTIONS* [online].
38. Sarkis, J. (1998) Evaluating environmentally conscious business practices. *European Journal of Operational Research* [online]. 107 (1), pp. 159–174. Available from: https://doi.org/10.1016/s0377-2217(97)00160-4.
39. Smith, C.W. and Stulz, R.M. (1985) The determinants of firms’ hedging policies. *Journal of Financial and Quantitative Analysis* [online]. 20 (4), p. 391. Available from: https://doi.org/10.2307/2330757.
40. Titman, S. and Wessels, R.E. (1988) The determinants of capital structure choice. *The Journal of Finance* [online]. 43 (1), pp. 1–19. Available from: https://doi.org/10.1111/j.1540-6261.1988.tb02585.x.
41. Viscelli, T.R., Beasley, M.S. and Hermanson, D.R. (2016) Research insights about risk governance. *SAGE Open* [online]. 6 (4), p. 215824401668023. Available from: https://doi.org/10.1177/2158244016680230.

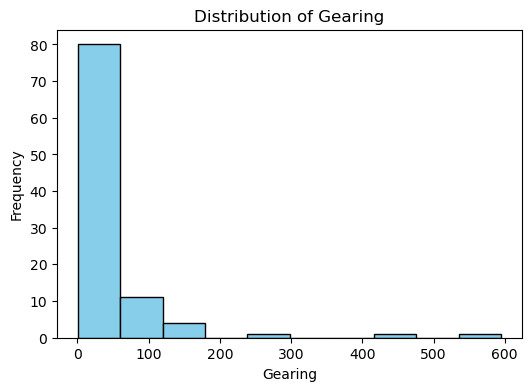
## Appendices

**Appendix 1:**

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**Graph 1**: Distribution of ROA.

**Appendix 2:**

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**Graph 2:** Distribution of Gearing Ratio.

**Appendix 3:**

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| |  | **Feature** | **VIF** | | --- | --- | --- | | 0 | ERMI Index | 1.499587 | | 1 | SIZE | 1.531573 | | 2 | ROA | 1.574695 | | 3 | Gearing | 1.188918 | | 4 | Growth Rate | 1.354956 | | 5 | Dividend or not | 1.554735 | | 6 | International Business | 1.103149 | | 7 | Beta 2022 | 1.119497 | | 8 | Mean VIF | 1.365889 | | |  |

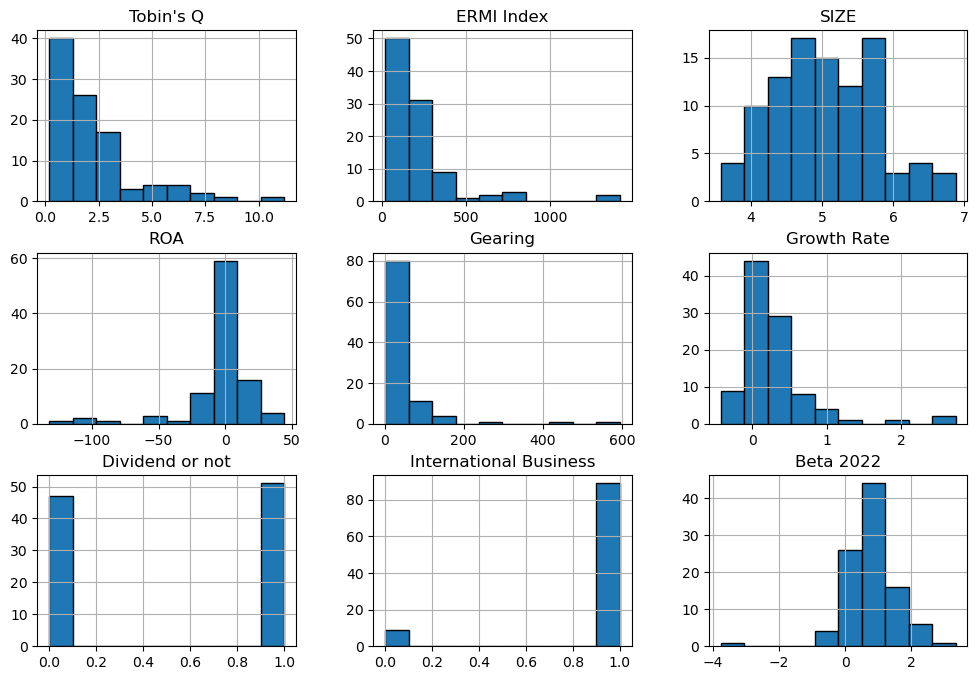
**Table 4:** VIF result.

**Appendix 4:**

|  |  |  |  |
| --- | --- | --- | --- |
| [**Nanoco Group plc**](https://disfold.com/company/nanoco-group-plc/) | [**Ideagen plc**](https://disfold.com/company/ideagen-plc/) | [**Spectris plc**](https://disfold.com/company/spectris-plc/) | [**IDE Group Holdings plc**](https://disfold.com/company/ide-group-holdings-plc/) |
| **Auto Trader Group Plc** | [**WANdisco plc**](https://disfold.com/company/wandisco-plc/) | [**Xaar plc**](https://disfold.com/company/xaar-plc/) | [**Checkit plc**](https://disfold.com/company/checkit-plc/) |
| [**Kainos Group plc**](https://disfold.com/company/kainos-group-plc/) | [**Spirent Communications plc**](https://disfold.com/company/spirent-communications-plc/) | [**1Spatial plc**](https://disfold.com/company/1spatial-plc/) | [**Alphawave IP Group plc**](https://disfold.com/company/alphawave-ip-group-plc/) |
| [**Cerillion plc**](https://disfold.com/company/cerillion-plc/) | [**Renishaw plc**](https://disfold.com/company/renishaw-plc/) | [**FD Technologies plc**](https://disfold.com/company/fd-technologies-plc/) | [**The Vitec Group plc**](https://disfold.com/company/the-vitec-group-plc/) |
| [**Alfa Financial Software Holdings plc**](https://disfold.com/company/alfa-financial-software-holdings-plc/) | [**Triad Group plc**](https://disfold.com/company/triad-group-plc/) | [**CML Microsystems plc**](https://disfold.com/company/cml-microsystems-plc/) | [**essensys plc**](https://disfold.com/company/essensys-plc/) |
| [**FDM Group (Holdings) plc**](https://disfold.com/company/fdm-group-holdings-plc/) | [**Oxford Instruments plc**](https://disfold.com/company/oxford-instruments-plc/) | [**Sopheon plc**](https://disfold.com/company/sopheon-plc/) | [**Gooch & Housego plc**](https://disfold.com/company/gooch-housego-plc/) |
| **4imprint Group PLC** | [**Calnex Solutions plc**](https://disfold.com/company/calnex-solutions-plc/) | [**Eleco plc**](https://disfold.com/company/eleco-plc/) | [**GB Group plc**](https://disfold.com/company/gb-group-plc/) |
| [**Eagle Eye Solutions Group plc**](https://disfold.com/company/eagle-eye-solutions-group-plc/) | [**Tracsis plc**](https://disfold.com/company/tracsis-plc/) | [**Nexteq Plc**](https://disfold.com/company/quixant-plc/) | [**Smartspace Software plc**](https://disfold.com/company/smartspace-software-plc/) |
| **EMIS Group PLC** | [**Altitude Group plc**](https://disfold.com/company/altitude-group-plc/) | [**IQE plc**](https://disfold.com/company/iqe-plc/) | [**Computacenter plc**](https://disfold.com/company/computacenter-plc/) |
| [**Blue Prism Group plc**](https://disfold.com/company/blue-prism-group-plc/) | [**Bango plc**](https://disfold.com/company/bango-plc/) | [**Filtronic plc**](https://disfold.com/company/filtronic-plc/) | [**Midwich Group plc**](https://disfold.com/company/midwich-group-plc/) |
| [**PensionBee Group plc**](https://disfold.com/company/pensionbee-group-plc/) | [**dotdigital Group plc**](https://disfold.com/company/dotdigital-group-plc/) | **AVEVA GROUP** | [**Cornerstone FS plc**](https://disfold.com/company/cornerstone-fs-plc/) |
| [**Quartix Holdings plc**](https://disfold.com/company/quartix-holdings-plc/) | [**Netcall plc**](https://disfold.com/company/netcall-plc/) | [**discoverIE Group plc**](https://disfold.com/company/discoverie-group-plc/) | [**Insig AI Plc**](https://disfold.com/company/insig-ai-plc/) |
| [**Blackbird plc**](https://disfold.com/company/blackbird-plc/) | [**SDI Group plc**](https://disfold.com/company/sdi-group-plc/) | [**ITM Power plc**](https://disfold.com/company/itm-power-plc/) | [**PayPoint plc**](https://disfold.com/company/paypoint-plc/) |
| [**Softcat plc**](https://disfold.com/company/softcat-plc/) | [**IDOX plc**](https://disfold.com/company/idox-plc/) | **STHREE PLC** | [**iomart Group plc**](https://disfold.com/company/iomart-group-plc/) |
| [**Windar Photonics plc**](https://disfold.com/company/windar-photonics-plc/) | [**Corero Network Security plc**](https://disfold.com/company/corero-network-security-plc/) | [**NCC Group plc**](https://disfold.com/company/ncc-group-plc/) | **PENNANT INTERNATIONAL GROUP PLC** |
| [**Darktrace plc**](https://disfold.com/company/darktrace-plc/) | [**Intercede Group plc**](https://disfold.com/company/intercede-group-plc/) | [**Access Intelligence plc**](https://disfold.com/company/access-intelligence-plc/) | [**TT Electronics plc**](https://disfold.com/company/tt-electronics-plc/) |
| [**ZOO Digital Group plc**](https://disfold.com/company/zoo-digital-group-plc/) | [**Beeks Financial Cloud Group plc**](https://www.annualreports.com/Company/beeks-financial-cloud-group-plc) | **ARCONTECH GROUP PLC** | **DILLISTONE GROUP PLC** |
| [**Fonix Mobile plc**](https://disfold.com/company/fonix-mobile-plc/) | [**ActiveOps Plc**](https://disfold.com/company/activeops-plc/) | [**Oxford Metrics plc**](https://disfold.com/company/oxford-metrics-plc/) | [**SysGroup plc**](https://disfold.com/company/sysgroup-plc/) |
| [**GetBusy plc**](https://disfold.com/company/getbusy-plc/) | **CROSSWORD CYBERSECURITY PLC** | [**Redcentric plc**](https://disfold.com/company/redcentric-plc/) | **CLOUDCOCO GROUP PLC** |
| [**Bytes Technology Group plc**](https://disfold.com/company/bytes-technology-group-plc/) | [**CyanConnode Holdings plc**](https://disfold.com/company/cyanconnode-holdings-plc/) | [**Solid State plc**](https://disfold.com/company/solid-state-plc/) | [**Maintel Holdings plc**](https://disfold.com/company/maintel-holdings-plc/) |
| [**Judges Scientific plc**](https://disfold.com/company/judges-scientific-plc/) | [**Gresham Technologies plc**](https://disfold.com/company/gresham-technologies-plc/) | [**K3 Business Technology Group plc**](https://disfold.com/company/k3-business-technology-group-plc/) | [**Micro Focus International plc**](https://disfold.com/company/micro-focus-international-plc/) |
| [**Concurrent Technologies plc**](https://disfold.com/company/concurrent-technologies-plc/) | **Sage Group PLC** | [**Auction Technology Group plc**](https://disfold.com/company/auction-technology-group-plc/) | [**TPXimpact Holdings PLC**](https://disfold.com/company/tpximpact-holdings-plc/) |
| [**SRT Marine Systems plc**](https://disfold.com/company/srt-marine-systems-plc/) | [**accesso Technology Group plc**](https://disfold.com/company/accesso-technology-group-plc/) | **IG Group PLC** | [**Actual Experience**](https://www.annualreports.com/Company/actual-experience) |
| [**IQGeo Group plc**](https://disfold.com/company/iqgeo-group-plc/) | [**Blancco Technology Group plc**](https://disfold.com/company/blancco-technology-group-plc/) | **Team Internet Group PLC** | [**RM plc**](https://disfold.com/company/rm-plc/) |
| [**Nanoco Group plc**](https://disfold.com/company/nanoco-group-plc/) | [**Eckoh plc**](https://disfold.com/company/eckoh-plc/) | [**Tribal Group plc**](https://disfold.com/company/tribal-group-plc/) | **The Hut Group PLC** |

**Table 8**: List of selected companies

Appendix 5: all distribution



Appendix: Record of meetings with your project supervisor

You are required to meet with your supervisor at least **three times a term** to ensure that progress with your project is satisfactory and to receive any guidance required. Please note that, if you fail to meet regularly with your supervisor, **you may have up to ten percentage points deducted from your project mark**. This is part of the evidence we will use to see whether you have effectively project managed your final year project.

|  |
| --- |
| Student’s name (and ID): HOANG NAM PHONG (21078242) |
| Project title: Does enterprise risk management affect technological firms’ value? Evidence from United Kingdom listed tech companies. |

**Record of meetings**

|  |  |
| --- | --- |
| **Date of meeting** | **(Main) subject of meeting and any principal action points** |
| 1st term |  |
| 2023-10-25 14:00 - 14:30 | This meeting was for both the student and the supervisor to discuss and have a better understanding of the topic chosen for the thesis and some suggestions.  The student started working on the project and refined the final research question. |
| 2023-11-12 | This meeting was for the student to update on the progression of the research proposal and verification to some questions related to the previous literature and data.  The student proceeded to finish the first proposal draft after the approval and clarification from the supervisor. |
| 2023-11-22 11:00 - 11:30 | This meeting was for both the student and supervisor to discuss the proposal, including the introduction, literature review and methodology and pointing out what’s good and what should be improved.  The student tried to improve upon the suggestions (i.e including a better “hook” for the reader in the introduction, having a clearer theoretical review, etc) |
|  |  |
| 2nd term |  |
| 2024-03-11 | This meeting was to clarify some of the student’s questions and concerns about the model and data they planned to use for the project.  As a result, the student could continue to work on the empirical analysis after having been clarified. |
| 2024-03-20 | This meeting was for the student to submit the Analysis chapter. |
| 2024-04-14 | The student received feedback for the Analysis and discussion chapter.  As a result, the student continued to work towards the final product. |

|  |
| --- |
| Name of supervisor signing off (including date): Dr. Maksud Onal |
| This is an accurate summary of the meetings that have taken place (electronic signature please)  Signed M. Onal  Date 08/05/2024 |

**It is your responsibility to see your supervisor the required number of times and to get this form completed, as required.**

**This form MUST be included in the appendix at the back of your dissertation.**

Appendix: template for project contract (to be submitted by end of teaching term Semester 1)

|  |
| --- |
| Your Name and (8-digit) Student Number: |
| HOANG NAM PHONG (21078242) |
| Your signature: |
| Title of your Final Year Project: |
| Does enterprise risk management affect technological firms’ value? Evidence from United Kingdom listed tech companies. |
| Summary outline of the research puzzle/for your final year project: (150 words) |
| This project explores the influence of Enterprise Risk Management (ERM) on the financial valuation of technology firms on the London Stock Exchange. The study aims to fill a significant research gap by assessing whether the quality of the ERM integrated within these firms not only helps them mitigate risks but actually also enhances their market value. The research will evaluate ERM's strategic benefits using quantitative analysis, more specifically Ordinary Least Square regression analysis of financial data and metrics like Tobin's Q. Findings are expected to provide valuable insights for technology sector managers and contribute to the academic understanding of ERM's role in improving firm resilience and performance in a rapidly evolving industry. |
| Summary outline of your research design including your principal sources of evidence that you will be using/constructing: (150 words) |
| For this study, a quantitative research design is used. It concentrates on technology companies that are listed in the LSE to explore how implementing ERM relates to the performance of such firms. The main sources of evidence will be financial details collected from FAME and Bloomberg database and yearly reports of companies. The chosen point of time is 2022. The analysis will involve calculating Tobin’s Q as the main method for measuring firm value, together with using OLS regression models to assess ERM's influence. For additional understanding and background, we will use secondary data sources like industry reports and academic literature. This method intends to show a significant connection between ERM methods and improved financial results, supporting the strategic value of ERM in technology field with statistical proof. |
| Key milestones for the second semester (with dates) |
| -Data Collection completion. (February 29th, 2024)  -Empirical Analysis and Discussion chapters completion (March 25th, 2024)  - Final submission of the full Project. (May 9th, 2024) |
| Name of supervisor signing off this project contract (including date): |
| Dr. Maksud Onal 08/05/2024 |
| ID for ethical review (from email) |
| 3265 |

**This form MUST be included in the appendix at the back of your dissertation.**

Appendix: Consent for Electronic Publication for UWE Library

A black and white logo

Description automatically generated

Student projects and dissertations

Faculty: Business and Law

Student’s name: Hoang Nam Phong

Award: BSc (Hons) Banking & Finance

Project/dissertation title: Does enterprise risk management affect technological firms’ value? Evidence from United Kingdom listed tech companies.

I give permission for UWE Library Services to hold and make available an electronic copy of this project/dissertation.

Signed:



Date: May 8th , 2024

e-mail address: Nam2.hoang@live.uwe.ac.uk

**This form MUST be included in the appendix at the back of your dissertation.**