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Article

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Enterprise risk management and cost of debt: the moderating role of crisis

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ABSTRACT

This study aims to investigate the relationship between enterprise risk management and cost of debt in the context of developing countries by considering the moderating role of the COVID-19 pandemic crisis period which is suspected to strengthen the negative association between these two variables. Using 310 non-financial sector companies listed on the Indonesia Stock Exchange for the period of 2018–2021 as samples, this study found that the implementation of effective risk management is associated with lower cost of debt charged by lenders. However, the association between these two variables was not visible during the COVID-19 crisis. These results are robust when sub-sample tests, assessment with alternative ERM measurements, and sensitivity test using the generalized method of moments (GMM) are performed. To the best of the authors' knowledge, this study is the first to address the direct relationship between enterprise risk management and external funding, especially cost of debt in the context of developing countries. In addition, this study is also the first to provide empirical evidence of the correlation between the COVID-19 pandemic and these two variables in the context of developing countries, specifically Indonesia.

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1. Introduction

Various phenomena occurring at the global and regional levels (such as: the global financial crisis, the economic slowdown in developed countries, and the COVID-19 pandemic) have quickly triggered numerous risk issues for businesses. In response to these problems, companies need to be able to assess various threats and opportunities to maintain their competitive advantage while creating value for stakeholders. This capability is known as enterprise risk management or ERM (Farrell & Gallagher, 2019; Chairani & Siregar, 2021). Initially, risk management was developed to manage risks that occurred in financial institutions and insurance companies (Schiller & Prpich, 2014). However, organizations increasingly realize that such risks are not only faced by financial institutions and insurance companies but also by non-financial organizations (Shad et al., 2019).

As an integrative holistic approach designed to identify and respond to possible risks in accordance with the company's risk appetite (COSO, 2004), ERM has been proven to positively affect company performance, reputation, and value in both crisis and normal economic contexts (Baxter et al., 2013; Nair et al., 2014; Florio & Leoni, 2017; Callahan & Soileau, 2017; Pérez-Cornejo et al., 2019; Horvey & Ankamah, 2020; Malik et al., 2020; Chairani & Siregar, 2021). Nevertheless, in its development, risk management practices have been more widely adopted by various institutions in developed countries, such as the United States, Canada, Australia, and European countries, resulting in very limited studies on ERM in

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developing countries (Saeidi et al., 2019; Pangestuti et al., 2023). This then raises the question of the economic impacts of ERM whose implementation is still voluntary for most companies in developing countries.

This study aims to answer the question by investigating the correlation between the implementation of enterprise risk management and external funding in Indonesia. As one of the determining factors for company growth and expansion, adequate access to funding is essential for smooth investment, innovation, and survival of the company (Nehrebecka & Dzik-Walczak, 2018). From the literature review, it is known that ERM and external funding have been discussed by Berry-Stölzle & Xu (2018) and Wang et al. (2018). Berry-Stölzle & Xu (2018) investigated whether ERM has an impact on reducing the cost of capital in the United States insurance industry for the period of 1992 to 2012. The study found that ERM can lower the cost of capital through systematic risk reduction so that company can avoid the accumulation of unexpected risks from various sources that limit its ability to invest in projects with a more positive NPV. Meanwhile, Wang et al. (2018) examined companies listed on the Taiwan Stock Exchange for the 2004–2015 period and found that ERM is a tool for external investors to reduce information asymmetry and mitigate earnings management practices when companies are involved in external funding. However, to the best of the authors' knowledge, no study has specifically examined the direct relationship between ERM and cost of debt in the context of developing countries.

Therefore, this study focuses on the cost of debt for the following reasons. First, debt financing is a vital component in the capital structure of companies throughout the world, especially in developing countries (Cumming et al., 2020; Thanatawee, 2023; Ye et al., 2023). The absence of a well-developed bond market and the existence of high adverse selection problems make debt financing a more attractive financing alternative for most developing countries (Caporale et al., 2018; Gaspareniene et al., 2019; Godlewski & Le, 2022). Second, lenders usually prepare debt contracts by considering the uncertainty of the business environment, risks, and returns of the company (Lemmon & Zender, 2019). If there is a possibility that the company's future cash flow will not be sufficient to cover the promised payments, lenders will be reluctant to charge lower interest rates and collateral values and offer longer maturity periods for the company, and vice versa (Bharath et al., 2008; Chandra & Setia-Atmaja, 2020).

Furthermore, this study also analyzes how the COVID-19 crisis moderates the relationship between ERM and cost of debt. Based on the perspective of dynamic capabilities (Bogodistov & Wohlgemuth, 2017), the COVID-19 pandemic is considered an appropriate exogenous event to measure the effectiveness of the implementation of enterprise risk management, especially in developing countries. During the pandemic period, an effective ERM system is highly needed by companies to develop organizational resilience in dealing with unexpected events and reduce the potential losses they will face (Baxter et al., 2013; Bogodistov & Wohlgemuth, 2017). A better understanding of company management about potential shocks to future cash flows allows companies to immediately respond to crises by understanding the sources of risk and types of strategies to overcome the crisis, thus enabling them to recover in the following year (Nair et al., 2014; Johnston & Soileau, 2020). These advantages are expected to strengthen the negative association between ERM and cost of debt during the pandemic.

To analyze the relationship between ERM and cost of debt, companies in Indonesia were chosen as the samples of this study for several reasons. First, as the country with the largest economy in Southeast Asia and the tenth largest in the world in terms of purchasing power parity, the country with the fourth largest population in the world, and a member of the G-20, Indonesia is still dominated by debt to banks as the main source of financing in businesses (Chandra & Setia-Atmaja, 2020; World Bank, 2021). Second, the strengthening of risk management regulations in Indonesia still focuses on the banking sector and non-bank financial institutions, making the implementation of risk management practices in non-financial companies remain voluntary. Furthermore, a previous study by Faisal et al. (2021) on 224 companies listed on the Indonesian Stock Exchange for the 2017–2018 period revealed that the implementation of risk management in Indonesian companies is still in the initial stage. This implies that various governance problems emerge as a result of the weak risk management systems of companies in Indonesia. Third, the pandemic that has occurred since early 2020 in Indonesia has led to an increase in corporate debt. Lockdown policies implemented by regional and national authorities around the world to contain the spread of the COVID-19 virus have inadvertently pushed companies into a solvency and liquidity crisis (Asian Development Bank, 2020; Bartik et al., 2020; World Bank, 2021). In

Indonesia, 82.85% of companies posted a decline in revenue, triggering an increase in the default rate of corporate debt securities by 35 times compared to that in 2019 (BPS, 2020; Fitch Ratings, 2021).

In this study, the ratio of interest costs to the average total company debt (Joni et al., 2020; Le et al., 2021) was used in the tests as a proxy for cost of debt. ERM was measured using three groups of eight aspects (ERM system quality, governance, and risk assessment) according to previous studies (Florio & Leoni, 2017; Pérez-Cornejo et al., 2019; Chairani & Siregar, 2021). Meanwhile, the period of 2020 and 2021 were chosen as the COVID-19 pandemic period since Indonesia officially declared the coronavirus outbreak a national disaster on 13 April 2020. By regressing 1240 non-financial observations (310 companies) for the 2018–2021 period listed on the Indonesian Stock Exchange, the findings of this study are as follows. First, ERM has a negative association with cost of debt as evidenced in the results of sub-sample test for the two year period before the pandemic (2018–2019). This indicates that the implementation of ERM enables companies to manage and increase the transparency of risk portfolio information effectively (Baxter et al., 2013; Berry-Stölzle & Xu, 2018), resulting in lenders to be willing to charge lower cost of debt for these companies. Second, a negative association between ERM and cost of debt during the COVID-19 pandemic period is not found in both the main test and sub-sample tests. This may be because ERM practices in non-financial companies in Indonesia are still at the initial stage and the implementation of ERM does not specifically change company risk level during the pandemic period (Callahan & Soileau, 2017). Third, the test results are robust as other alternative ERM measurements are made.

After the Introduction section, this article is structured as follows: Section 2 summarizes the background of risk management and debt financing practices in the Indonesian context. The literature review relating to the theories used in this study is presented in Section 3, whereas hypothesis development is described in Section 4. The sample selection, data sources, measurement of each variable, and research methodology are explained in Section 5. Meanwhile, the results of the main test, additional (sub-sample) tests, and sensitivity test are discussed in Section 6. Finally, Section 7 covers the main findings, conclusions, and suggestions for future studies.

2. Institutional background

2.1. Enterprise risk management in Indonesia

The latest risk management standards used in Indonesia are prepared based on the COSO framework (2017) and ISO 31000:2018. To date, the strengthening of risk management regulations in Indonesia still focuses on the banking sector and non-bank financial institutions. The implementation of Risk Management for Commercial Banks is regulated in the Indonesia Financial Services Authority (*Otoritas Jasa Keuangan/OJK*) Regulation No. 18/POJK.03/2016 and the OJK Regulation No. 65/POJK.03/2016, whereas that of Non-Bank Financial Institutions is stipulated in the OJK Regulation No. 01/POJK.05/2015. In addition, several ministries have issued ministerial regulations regarding risk management, such as the Regulation of the Minister of Finance No. 191/PMK.09/2008 on the Implementation of Risk Management within the Ministry of Finance; the Regulation of the Minister of State-Owned Enterprises No. PER-01/MBU/2011 on the Implementation of Good Corporate Governance in the Indonesian State-Owned Enterprises; and the Regulation of the Minister of Law and Human Rights No. 5 of 2018 on the Implementation of Risk Management within the Ministry of Law and Human Rights.

However, even though several institutions have made the implementation of ERM within their environment mandatory, risk management practices in non-financial companies remain voluntary. When deciding to implement risk management in their business environment, non-financial companies usually have diverse backgrounds and goals, ranging from demands from shareholders, incidents from past decisions, requirements from regulators, and reflecting on other companies to the reason of ‘to win prestigious awards’ (CRMS Indonesia, 2021). This makes the implementation of risk management merely a routine without providing benefits and creating values for the company, eventually leading to the emergence of various governance problems as a result of the company’s weak risk management system. The examples of this include the criminal case of corruption by the President Director of PT Pertamina in 2009 that resulted in state losses amounting to 586 billion rupiah which occurred as a result of internal

compliance violations; the case of PT Nyonya Meneer which was declared bankrupt in 2017 due to the third generation's inability to manage upside risks (failure to exploit local and foreign markets, as well as the inability to synchronize supply chains and value chains) and downside risks (work strikes, human rights demonstrations, and delays in debt payments); and the insurance default of PT Asuransi Jiwasraya upon customer claims worth 802 billion rupiah as a result of the ineffective implementation of ERM where early preventive measures did not occur even though there were indications of risk through the Audit Board of the Republic of Indonesia (*Badan Pemeriksa Keuangan Republik Indonesia/BPK RI*) audits and OJK supervision.

2.2. Debt financing in Indonesia

Corporations in the manufacturing sector and the mining sector, especially coal, make relatively large use of foreign debt as a source of corporate financing. The need for external financing for corporations in Indonesia has increased in recent years (BI, 2019). In December 2018, non-financial corporations recorded external financing needs of 4,699.82 trillion rupiah or grew 11.66% (yoy). Meanwhile, in December 2019, corporate credit only grew by 8.51% (yoy). In general, corporations' ability to pay has decreased amid continuing global pressures. The median debt coverage service ratio (DSCR) figure decreased to below 100%, while the interest coverage ratio (ICR) decreased to below 2 but was still quite significantly above the threshold of 1.5. Nevertheless, several sectors still need to be wary of as they have a lower repayment capacity compared to the industrial aggregate, namely the agricultural, mining, transportation sectors (BI, 2020).

In the second quarter of 2020, the world faced increased uncertainty and contraction in economic growth due to the outbreak of the COVID-19 pandemic. As the supervisor of the Indonesian financial services sector, OJK issued the OJK Regulation No. 11/POJK.03/2020 containing a relaxation policy on 16 March 2020 (OJK, 2021) to help corporations face the crisis. The implementation of this policy reached its peak in April-May 2020 and started to slow down in June 2020. As the spread of COVID-19 continued afterward, OJK then extended the period of its relaxation policy for bank credit restructuring until March 2023 by issuing the OJK Regulation No. 48/POJK.03/2020 and the OJK Regulation No. 17/POJK.03/2021.

With the issuance of various stimuli by the Indonesian Government, Bank Indonesia, and OJK, as well as optimism for recovery from the discovery of vaccines, investor confidence has gradually started to recover. The improvement in global trade in the second half of 2020, which was mainly driven by increased economic activities in East Asia and the United States, also enhanced corporate performance. However, this improvement was limited to the trade of goods, while that of services still experienced stagnation. In the context of Indonesia, this improvement encouraged an increase in demands for Indonesian export commodities, which in turn supported improvements in the performance of non-financial corporations.

3. Theoretical framework

3.1. Resource-based view theory

Resource-based view (RBV) refers to company ability to obtain, utilize, and integrate all internal resources in order to achieve sustainable competitive advantage (Savino & Shafiq, 2018; Tseng et al., 2021). With regard to ERM, Saeidi et al. (2019) have explained why ERM can provide competitive benefits for companies. First, ERM systems are unique and not freely available on the market. Each organization has its own ERM system that is tailored to the company's activities, missions, and goals, making it irreplaceable, difficult to transfer, and difficult to imitate (Beasley et al., 2005). Second, ERM can help companies to organize and manage risks in an integrated manner so as to increase risk portfolio information (Baxter et al., 2013; Berry-Stölzle & Xu, 2018). Although the implementation of enterprise risk management does not specifically change the level of corporate risk, it influences the measurement and monitoring of risks throughout the company (Callahan & Soileau, 2017). ERM enables the company to understand more about industry risks, adapt to the situation, and take actions more quickly than competitors, thus increasing the company's opportunities to achieve financial and non-financial goals (COSO, 2004; Elahi, 2013).

The outbreak of the COVID-19 pandemic has forced many companies to close or reduce their operations, resulting in a large-scale decline in sales and significant employment adjustments (Apedo-Amah et al., 2020). In addition, the uncertainty that occurred during the pandemic also caused companies to massively cut spending related to innovation, training, and management development, which will affect productivity growth in the future (Baker et al., 2020). This condition then sparked off debate about the importance of implementing ERM in dealing with crises. In periods of crisis, companies can use an effective risk management system to develop organizational resilience in overcoming unexpected events and reduce potential losses (Baxter et al., 2013; Bogodistov & Wohlgemuth, 2017). Furthermore, Nair et al. (2014) who studied the insurance industry in the United States during the 2008 crisis period also reported a similar finding that companies with a better ERM system more quickly identify resources for use to face the crisis and reorganize their resource base to minimize the impact of the crisis on company performance.

4. Empirical literature review and hypothesis development

4.1. ERM and cost of debt

In describing the relationship between ERM and cost of debt, this study refers to the resource-based view theory that ERM can be used as a tool to gain competitive advantages. By focusing on integrated risk management, effective risk management practices are expected to allow companies to experience fewer earnings surprises (profit volatility) than those without ERM (Baxter et al., 2013; Berry-Stölzle & Xu, 2018). The ability of a company to avoid the accumulation of unexpected risks from various sources, adapt well, and take action more quickly than competitors (COSO, 2004; Elahi, 2013) is expected to lower the risk of loan default (Bundy et al., 2017). This is in line with the finding of a study by Tonello (2007) that effective implementation of ERM by considering the consequences of downside and upside risks leads to better company investment decisions and a more objective basis for allocating company resources for cost effectiveness.

Risk management can also improve risk portfolio information which will increase transparency and reduce risk exposure (Baxter et al., 2013; Berry-Stölzle & Xu, 2018; Pérez-Cornejo et al., 2019; Malik et al., 2020). An effective risk management shows that the company can manage risks and mitigate moral hazard behavior effectively by increasing the transparency of risk portfolio information. The higher the quality of the risk management system, the smaller the potential losses faced by the company and the lower the cost of debt charge by lenders. Based on the explanation above, the first hypothesis was proposed as follows:

H1. ERM has a negative association with the cost of debt.

4.2. ERM and cost of debt: the moderating role of COVID-19

In general, increased uncertainty and risk coupled with reduced returns during a crisis period can affect company capital structure (Danso et al., 2021). During crises, lenders become unwilling to commit to long-term investments due to a higher possibility of default (Dick et al., 2013; Lemmon & Zender, 2019). Such condition was present during the pandemic period. The influx of liquidity injections from the government along with high levels of banking capital has indeed allowed lenders to accommodate the surge in liquidity demand (Li et al., 2020). However, because lending institutions were faced with an uncertain economic outlook and a situation where they have to evaluate and monitor credit risks with limited visibility, lenders emphasized the principle of prudence and carried out strict monitoring of debtors (IMF, 2020; Koulouridi et al., 2020; Demirgüç-Kunt et al., 2021).

This situation has created new challenges for the development of ERM practices throughout the world (Anton & Nucu, 2020; Pagach & Wieczorek-Kosmala, 2020; Preuss & Königsgruber, 2021). A substantial decline in sales, significant employment adjustments (Apedo-Amah et al., 2020), massive spending cuts surely affect company productivity growth in the future (Baker et al., 2020). From the perspective of dynamic capabilities, Bogodistov and Wohlgemuth (2017) assumed that effective risk management is

useful in dealing with the complexity of company operations and exogenous events such as the global crisis. ERM focuses not only on preventing events but also on developing organizational resilience to deal with occurring events, particularly unexpected ones. Similarly, Baxter et al. (2013) discovered that the benefits of implementing risk management are more visible in periods of crisis where risks receive greater attention from various parties. The higher the quality of the company's risk management, the better the management's understanding of potential shocks to future cash flows, allowing the company to immediately respond to the situation, overcome the crisis, and recover in the following year (Nair et al., 2014; Johnston & Soileau, 2020).

These various findings signify that the implementation of risk management during the pandemic is expected to enable the company to mitigate potential losses, uncertainty, information asymmetry, and loss of reputation so as to increase lenders' confidence when making or renewing debt contracts with debtors (Bundy et al., 2017; Callahan & Soileau, 2017; Berry-Stölzle & Xu, 2018). Based on the arguments above, the second hypothesis was proposed below:

H2. The COVID-19 pandemic amplifies the negative association between ERM and cost of debt.

5. Research design

5.1. Sample selection and data sources

This study observed non-financial companies listed on the Indonesia Stock Exchange in 2018–2021. As Indonesia officially declared the coronavirus outbreak a national disaster on 13 April 2020 through Presidential Decree No.12 of 2020, 2020 and 2021 were chosen as the COVID-19 pandemic period, whereas 2018 and 2019 were regarded as the normal economic period of 2 years before the COVID-19 pandemic. Financial data was obtained from the Datastream database, while information regarding ERM was collected manually through companies' annual reports.

Details of the total observations are presented in Table 1 Panel A. A total of 20 State Owned Enterprises (SOEs) and Regional Owned Enterprises (ROEs) were excluded as they are required to implement an integrated enterprise risk management as part of the Good Corporate Governance (GCG) program in accordance with the Regulation of the Minister of State-Owned Enterprises No. PER-01/MBU/2011. Furthermore, 299 companies with incomplete data were also excluded. Based on these purposive sampling criteria, 1,240 observations (310 companies per year) were included to test the hypotheses.

As seen in Table 1 Panel B, the observations in this study are dominated by companies from the non-primary consumer goods sector which represent around 21% of the sample size. The sectors with the second and third largest distribution are primary consumer goods and property and real estate which have a percentage of 17% and 15%, respectively.

Table 1. Sample description.

Panel A: Sample selection process			
Note			Company
Non-financial companies in the 2018–2021 period			629
Excluded:			
Companies /subsidiaries of SOEs and ROEs			(20)
Unreadable pdf and incomplete financial data			(299)
Hypothesis testing samples			310
Panel B: Sample Distribution per Sector			
No.	Sector	Number of observations	%
1	Energy	136	11
2	Raw Materials	152	12
3	Industry	72	6
4	Primary Consumer Goods	208	17
5	Non-Primary Consumer Goods	264	21
6	Health	32	3
7	Property and Real Estate	180	15
8	Technology	24	2
9	Infrastructure	104	8
10	Transportation and Logistics	68	5
Total		1240	100%

5.2. Measurement of variables

5.2.1. Cost of debt

The dependent variable in this study is cost of debt (CoD), which is calculated as the ratio of the company's interest costs in year $y+1$ divided by the average total debt of the company in year $y+1$ (Joni et al., 2020; Le et al., 2021).

5.2.2. Enterprise risk management (ERM)

To measure enterprise risk management (ERM), eight aspects from three groups were used in this study. The first group consists of three aspects of ERM system quality (Pérez-Cornejo et al., 2019) namely ERM system scope, ERM definition, and COSO framework. In this first group, aspects of the ISO 31000 framework were also added as it is also used as a reference for risk management that has been widely adopted by companies throughout the world (Chairani & Siregar, 2021; Karanja, 2017). The second and third groups were based on studies by Florio & Leoni (2017) and Chairani & Siregar (2021). The second group comprises of two aspects related to governance, i.e., chief risk officer (CRO) and risk committee (RiskCom). Meanwhile, the third group contains two aspects concerning risk assessment, i.e., risk assessment method (RAMethod) and risk assessment frequency (RAFreq). In the measurements, these eight aspects were adapted to the Indonesian context.

In identifying these eight aspects, analysis of sample companies' annual reports was made. For each aspect, score was given according to the criteria in Table 2. The scores obtained were then converted into a dummy variable (given a value of 1 if the score of each item is above the median value, 0 if otherwise) and the composite value was calculated to obtain the score range of 0–8. The ERM value included in the test is the advERM (advance ERM) calculated with a dummy variable that is given a value of 1 if the composite observation score is greater than 4 and 0 if otherwise.

5.2.3. COVID-19

The period of 2020–2021 was chosen as the COVID-19 pandemic period because Indonesia officially declared the coronavirus outbreak a national disaster on 13 April 2020 through Presidential Decree No. 12 of 2020 on the Determination of the Non-Natural Disaster of the Spread of Corona Virus Disease 2019 (COVID-19) as a National Disaster. Meanwhile, the period of 2018–2019 was used as the pre-pandemic period. The COVID-19 (COV19) pandemic variable was measured using a dummy variable, given the value 1 if the observation period is within 2020 and 2021, and 0 if not.

5.2.4. Control variables

Several control variables related to cost of debt, i.e., leverage, size, age, market to book, PPE, and board independence, were also included in this study according to previous studies (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021). As displayed in Table 3, the measurement of each variable is as follows. Leverage was measured using the ratio of total debt to total assets, size was measured using the natural logarithm of total assets, while age was measured using the natural logarithm of the number of years since the company was founded. Market to book was calculated by rationing the book value to the equity market, while the property, plant, and equipment (PPE) variable was calculated by dividing the value of fixed assets by total assets.

Lastly, the board independence variable was used to measure the internal monitoring role of the board of commissioners according to studies by Bliss and Gul (2012) and Joni et al. (2020). This variable was measured using the ratio between the number of independent members of the board of commissioners to the total members of the board of commissioners and board of directors of the company. Previous studies have found that lenders tend to charge higher cost of debt to companies with high leverage to compensate for risk. Meanwhile, companies with higher SIZE, AGE, MTB, PPE, and BOARDIND values are associated with lower risk, causing lenders to charge lower cost of debt (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).

Table 2. Summary of enterprise risk management measurements.

1. ERM system scope (Pérez-Cornejo et al., 2019)	
The risk management system is implemented holistically and continuously , there is consolidation based on areas, business units or activities, subsidiaries, geographic areas, and supporting areas at the corporate level.	3
Risk management is implemented at the group or corporate level but not based on areas, business units or activities, subsidiaries, geographic areas, and supporting areas at the corporate level.	2
The company has a risk management system but does not determine the scope of its implementation.	1
The company does not have a formally defined risk management system.	0
2. ERM definition (Pérez-Cornejo et al., 2019)	
A. The company has a risk map .	+1
A. Risk management is identified as a tool to achieve company goals .	+1
A. The company identifies risk management as an ongoing and sustainable process .	+1
Total score of ERM definition = A + B + C	
2. COSO framework (Pérez-Cornejo et al., 2019)	
The COSO framework is concerned with overall enterprise risk .	2
The COSO framework is only concerned with financial risks .	1
The company does not mention COSO as the risk management framework it uses.	0
3. ISO framework (Chairani & Siregar, 2021)	
The ISO framework is concerned with overall enterprise risk .	2
The ISO framework is only concerned with financial risks .	1
The company does not mention ISO as the risk management framework it uses.	0
4. Chief risk officer (Florio & Leoni, 2017; Chairani & Siregar, 2021)	
The company has a chief risk officer.	1
The company does not have a chief risk officer.	0
5. Risk committee (Florio & Leoni, 2017; Chairani & Siregar, 2021)	
The company has a risk committee.	1
The company does not have a risk committee.	0
6. Risk assessment frequency (Florio & Leoni, 2017; Chairani & Siregar, 2021)	
Risk assessments and/or risk reporting procedures are carried out twice or more a year .	2
Risk assessments and/or risk reporting procedures are carried out at least once a year .	1
The company does not disclose information regarding risk assessments and/or risk reporting procedures.	0
7. Risk assessment method (Florio & Leoni, 2017; Chairani & Siregar, 2021)	
The risk assessment method of the company is quantitative (with monetary figures).	2
The risk assessment method of the company is qualitative (narrative without monetary figures).	1
The company does not disclose information regarding the risk assessment methods it uses.	0

5.3. Empirical model

To test the association between ERM and cost of debt by considering the moderating role of the COVID-19 crisis, this study used the Ordinary Least Squares (OLS) model as follows:

$$VeDBA = \sqrt{(DBAX)^2 + (DBAY)^2 + (DBAZ)^2} \quad (1)$$

where $CoD_{i,y}$ is the cost of debt of company i in year y , $ERM_{i,y}$ refers to the risk management of company i in year y , $COV19$ is the period of the COVID-19 pandemic calculated using a dummy variable, while CV_{iy} is a representation of the control variable. Hypothesis testing in this study was also accompanied by firm fixed effects to overcome heterogeneity at the company and industry level as well as year fixed effects to control macroeconomic and industrial shocks if the Hausman and Lagrange Multiplier test results indicate FEM (fixed effect model) as the best testing model.

6. Empirical results and discussions

6.1. Univariate analysis

To overcome the problem of outliers in the data, winsorization was employed with an upper and lower percentile limit of 2.5%. Table 4 shows the general description of the descriptive statistics. The interest rate charged for sample companies ranges from 0.4% to 18.4%, with an average interest rate of 7.5% per year. The advERM score of the sample companies is relatively low (5.4%), indicating that only a small

Table 3. Summary of variable measurements.

Variables	Measurements
Cost of Debt (CoD)	Ratio of the company's interest costs in year y + 1 divided by the average total debt of the company in year y + 1 (Joni et al., 2020; Le et al., 2021)
Enterprise Risk Management (ERM)	Using eight aspects of ERM consisting of three groups (system quality, governance, and risk assessment) based on previous studies (Florio & Leoni, 2017; Pérez-Cornejo et al., 2019; Chairani & Siregar, 2021) as summarized in Table 2. The ERM value was calculated using a dummy variable, given a value of 1 if the composite observation score is greater than 4 and 0 if otherwise.
COVID-19 (COV19)	Using a dummy variable, given a value of 1 if the observation period is in 2020 and 2021 and 0 if not
Leverage	Ratio of total debt to total assets (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).
Size	Natural logarithm of total assets (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).
Age	Natural logarithm of the number of years since the company was founded (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).
Market to book	Ratio of book value to equity market value (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).
Property, plant, and equipment (PPE)	Ratio of fixed asset value to total assets (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).
Board Independence	Ratio of the number of independent members of the board of commissioners to the total members of the board of commissioners of the company (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).

Table 4. Descriptive statistics.

Variables	Obs	Mean	Std. dev	Min	Max
CoD	1240	0.075	0.038	0.004	0.184
ERM	1240	0.054	0.227	0	1
COV19	1240	0.500	0.500	0	1
Leverage	1240	0.730	2.075	0.002	13.825
Size (in trillions of Rupiah)	1240	10.485	26.825	0.218	362.078
Age (in years)	1240	40.88	31.49	3	121
MTB	1240	2.441	4.120	-0.565	25.34
PPE	1240	0.434	0.266	0.009	0.927
BoardInd	1240	0.484	0.127	0.300	0.833

number of non-financial companies listed on the Indonesia Stock Exchange in 2018–2021 have implemented risk management effectively. Furthermore, the sample companies have average total assets of 10 trillion rupiah, an average leverage of 73%, an average company age of 40 years, and average values of market to book ratio, PPE, and boardInd of 2,441, 43.4%, and 48.4%, respectively.

Prior to the regression test, a correlation test (Pearson Correlation) was conducted to determine the correlation between variables and the cost of debt. As shown in Table 5, there is no strong correlation (<0.70) between variables and no correlation between the cost of debt variable and the enterprise risk management variable. Furthermore, the pandemic (COVID-19), size, and age variables are significantly and negatively correlated with the cost of debt of the company at the 5% level.

6.2. Regression results

A multivariate analysis was performed using the Ordinary Least Square estimation model. To obtain the best estimation model, a classical assumption test was carried out first. In addition, the Hausman test and the Lagrange Multiplier (LM) test were also done to determine the best testing model on panel data. Based on these tests, the model was estimated using Random-Effect and a robust standard error was used during the tests because there were heteroscedasticity problems in the data.

The results of hypothesis testing can be seen in Table 6 Panel A. Hypothesis 1 (H1) aims to test whether ERM is negatively associated with the company's cost of debt, which is proven if the ERM coefficient is <0 and significant. The results show that the ERM coefficient is 0.012, significant at the 5% level, and has a negative direction towards the company's cost of debt. In line with the resource-based view theory, these results indicate that lenders will be willing to charge lower cost of debt for companies that can manage risks in an integrated manner (Baxter et al., 2013; Berry-Stölzle & Xu, 2018) and increase the transparency of risk portfolio information effectively (Baxter et al., 2013; Berry-Stölzle & Xu, 2018; Pérez-Cornejo et al., 2019; Malik et al., 2020). Thus, **H1 is supported by the data.**

Table 5. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CoD	1.000								
(2) ERM	−0.039	1.000							
(3) COV19	−0.100	0.050	1.000						
(4) Leverage	−0.030	0.102	0.064	1.000					
(5) Size	−0.110	0.108	0.018	−0.264	1.000				
(6) Age	−0.080	−0.059	0.052	−0.068	−0.063	1.000			
(7) MTB	0.053	−0.015	−0.077	−0.052	−0.078	0.114	1.000		
(8) PPE	−0.025	0.049	0.022	0.035	−0.097	−0.039	0.078	1.000	
(9) BoardInd	−0.023	−0.090	0.059	0.015	−0.122	−0.018	0.018	0.111	1.000

Numbers in bold indicate significance at $p < 0.05$.

Furthermore, Hypothesis 1 (H2) aims to test the role of the pandemic (COV19) in strengthening the negative association between ERM and cost of debt, which is proven if $ERM \times COV19 < 0$ and significant. As shown in Table 6, the results indicate that the moderation coefficient is positive and not significant ($ERM \times COV19 = 0.006$, $t = 0.82$), implying that the implementation of ERM during the pandemic does not make lenders offer debt relief for companies. Therefore, **H2 is not supported by the data**. The explanations of these findings are as follows. First, ERM practices in non-financial companies in Indonesia are still voluntary, so their implementation is still in the initial stage (Faisal et al., 2021). As reflected in Table 4, only a few sample companies (5.4%) have implemented ERM effectively during the observation period. This implies that companies with less reliable ERM in assessing risk portfolios accurately will be subject to stricter debt contract terms to compensate for the high risk of default during times of crisis. Second, the implementation of ERM is expected to help companies understand the risks inherent in all aspects of business activities and increase the transparency of risk portfolio information (Chairani & Siregar, 2021), but it does not specifically change the company's risk level (Callahan & Soileau, 2017). Based on data from the Statistics Indonesia, 82.85% of companies in Indonesia posted a decline in revenue at the beginning of the pandemic, triggering an increase in the value of defaults on corporate debt securities by 35 times compared to 2019 (BPS, 2020; Fitch Ratings, 2021). Despite the various monetary policies related to relaxation issued by OJK, corporate credit still had a higher average interest rate of 11%–12% until the first quarter of 2021, even though average bank funding costs have fallen to 9%–10% (Fitch Ratings, 2021). The increased risk of default and the slow ability of the company to recover during the pandemic have caused the cost of debt to continue to increase even though the company has implemented ERM effectively.

As for the control variables, Table 6 Panel A shows that the size, age and, boardInd variables have a significant negative value on cost of debt. These results are in line with previous studies which found that larger companies are considered less risky as they are more stable and established, and also support the reputation effect that older companies that have built good relationships with lenders over a longer period of time and those having adequate monitoring mechanisms will reduce information asymmetry between the agent (company) and the principal (lender) and make lenders willing to lower the cost of debt (Bliss & Gul, 2012; Siagian et al., 2013; Utama et al., 2017; Joni et al., 2020; Le et al., 2021).

6.3. Additional tests and sensitivity test

6.3.1. Sub sample tests: before the pandemic (2018–2019) and during the pandemic (2020–2021)

To avoid concerns that the results of the main test are influenced by data from the pandemic period, sub-sample tests were conducted using two observation periods, namely the pre-pandemic period (2018–2019) and the pandemic period (2020–2021). The results of these additional tests can be seen in Table 6 Panel B (pre-pandemic period) and Panel C (pandemic period). As displayed in Panel B, ERM has a significant negative association ($ERM = -0.012$, $t = -1.63$) with cost of debt. This confirms the result of the main test that the more effective the risk management system, the more willing the lenders to charge lower cost of debt as a result of reduced uncertainty and information asymmetry between the company and the lenders (Bundy et al., 2017). Furthermore, leverage has a positive association with cost of debt, whereas the size and monitoring of the board of commissioners has a negative association with cost of debt (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021).

Table 6. Results of testing the relationship between ERM and cost of debt.

Variables	Hypothesis	Prediction	Main Test	Additional Test and Sensitivity Test			
			Panel A	Panel B	Panel C	Panel D	Panel E
L.CoD							0.371*** (3.67)
ERM	H1	–	–0.012** (–1.91)	–0.012* (–1.63)	–0.008 (–1.28)		–0.014* (–1.35)
ERM25						–0.079* (–1.36)	
ERM*COV19	H2	–	0.006 (0.82)			0.075 (1.02)	–0.004 (–0.53)
COV19		–	–0.007*** (–3.94)			–0.132*** (–3.53)	–0.002 (–0.87)
Leverage		+	0.000 (0.34)	0.001** (1.88)	–0.001* (–1.35)	0.008 (1.07)	0.001 (0.34)
Size		–	–0.003** (–2.30)	–0.024* (–2.68)	–0.003** (–2.25)	–0.032* (–1.30)	0.003 (0.36)
Age		–	–0.005** (–1.85)	–0.046 (–0.75)	–0.004* (–1.41)	–0.087** (–1.83)	–0.012 (–0.42)
MTB		–	0.000 (0.22)	0.000 (0.97)	0.000 (1.26)	–0.004 (–0.44)	–0.000 (–0.12)
PPE		–	–0.005 (–0.90)	0.010 (0.51)	–0.002 (–1.17)	–0.052 (–0.44)	–0.089*** (–3.46)
BoardInd		–	–0.026* (–1.56)	–0.089** (–2.27)	–0.018 (–0.95)	–0.407 (–1.26)	–0.078*** (–3.08)
Intercept			0.164*** (5.63)	–0.283 (–0.99)	0.156*** (4.55)	–1.561*** (–2.57)	0.074 (0.29)
Obs.			1240	620	620	1240	930
R ²			0.0302	0.0598	0.0270	0.0299	
Prob > Chi ²			0.0000	0.0084	0.0756	0.0008	0.000
Estimation			Random effect	Fixed effect	Random effect	Random effect	
Hettest			Yes	Yes	No	Yes	
Sargan-test							0.0877

Note: This table reports the results of the main test (Panel A), additional tests (Panels B and C) and sensitivity tests (Panels D and E) of the association between ERM and cost of debt, where L.CoD=the lag of the cost of debt used in analyzing the generalized method of moments; CoD (cost of debt) = the ratio of the company's interest costs in year $y+1$ divided by the average total debt in year $y+1$; ERM (enterprise risk management) = dummy variable based on eight aspects of ERM (system quality, governance, and risk assessment); ERM25=25% of observations with the highest aggregate ERM values; COV19=a dummy variable of the COVID-19 period, 1 if the observation period is in 2020 and 2021 and 0 if not; Leverage=total debt divided by total assets of the company; Size=natural logarithm of total company assets; Age=company age; MTB=ratio of book value to equity market value; PPE=ratio of fixed asset value to total assets; and BoardInd=ratio of the number of independent members of the board of commissioners to the total members of the board of commissioners of the company. Statistical significance is denoted by asterisk(s): ***, ** and *, corresponding to significance levels of 1%, 5%, and 10%, respectively.

Table 6 Panel C presents the results of the sub-sample test during the pandemic period. In accordance with the results of the main test, ERM has a negative direction and is not associated ($ERM = -0.008$, $t = -1.28$) with cost of debt during the pandemic. The results of the test on the control variables in Panel C also support previous studies that the size and age variables have a negative association with cost of debt (Bliss & Gul, 2012; Joni et al., 2020; Le et al., 2021). In contrast to the test results in Panel C and those in previous studies, the leverage variable actually has a negative association with cost of debt. This is suspected to be due to the issuance of various monetary policies related to credit restructuring in Indonesia during the pandemic. One of the restructuring schemes, namely reducing interest rates, is suspected to cause lenders to continue charging low cost of debt even though the company has a fairly high level of leverage.

6.3.2. An estimation alternative to enterprise risk management (ERM)

To examine the robustness of the main test results, 25% of the observations with the highest aggregate ERM values were classified as observations that implement ERM effectively, which are referred to as ERM25. This is a dummy variable and the value of 1 is given to the 25% of observations with the highest ERM aggregate values, 0 if otherwise. The results of the sensitivity test can be seen in Table 6 Panel D. In line with the results of the main test, hypothesis 1 remains supported; the ERM coefficient has a significant negative direction towards cost of debt ($ERM = -0.079$, $t = -1.36$), while the ERM*COV19 moderation coefficient has a positive and insignificant direction towards cost of debt ($ERM * COV19 = 0.075$, $t = 1.02$). Therefore, hypothesis 2 is not supported by the data.

6.3.3. Generalized method of moments to overcome endogeneity problems

Furthermore, sensitivity analysis was also performed using the generalized method of moments (GMM) model to reduce bias that may arise due to the relationship between explanatory variables (Ullah et al., 2018). Endogeneity was controlled by internally transforming the data, namely adding a lag of the dependent variable into the model to capture its persistence (Schultz et al., 2010; Wintoki et al., 2012; Ullah et al., 2018). As seen in Table 6 Panel E, the results of this sensitivity test still provide support for H1 ($ERM = -0.014$, $t = -1.35$). Meanwhile, the moderation coefficient still has no significant correlation with cost of debt ($ERM * COV-19 = -0.004$, $t = -0.53$), meaning that H2 is not supported by the data.

7. Summary and conclusion

This study aims to provide evidence of the relationship between enterprise risk management (ERM) and cost of debt in the context of developing countries. By using Indonesia as the sample country, the results of this study confirm the resource-based view theory that competitive advantages obtained from implementing effective risk management are associated with lower cost of debt charged by lenders. This is also proven in sub-sample test using the pre-pandemic period (2018–2019). Furthermore, this study also aims to analyze the role of the COVID-19 crisis in moderating the relationship between ERM and cost of debt. However, the argument that the negative association between ERM and cost of debt will become stronger during the pandemic is not proven. In contrast to previous studies which reported that the benefits of implementing risk management are more visible during the period of crisis, this study found no significance between the two variables both in the main test and sub-sample test in the pandemic period (2020–2021). This finding can be explained as follows. First, ERM practices for non-financial companies in Indonesia are voluntary and still at the initial stage until the end of 2021, so lenders cannot rely on them to accurately assess risk portfolios. Consequently, lenders are not willing to provide looser debt contract terms (i.e. lower cost of debt) to compensate for the higher risk of default during periods of crisis. Second, the implementation of ERM does not specifically change company risk level. The decline in income followed by the high increase in liquidity risk of companies in Indonesia during the pandemic has caused the cost of debt to continue to increase even though the company has implemented ERM effectively.

This study has several implications for companies, regulators, and stakeholders. *For companies* – although the implementation of ERM systems is costly and voluntary for non-financial companies in Indonesia, these resources are needed to generate competitive advantages. In the context of this study, the effective implementation of ERM is proven able to make lenders willing to lower the cost of debt. *For regulators* – this study provides information on the positive correlation between ERM and company funding activities. In the future, regulators are expected to be able to review and issue special regulations regarding the strengthening of ERM for non-financial companies in Indonesia. *For stakeholders* – before making an investment decision, both investors and creditors can review how ERM is implemented in the company as it is hoped that companies with more structured and integrated risk management can create values for stakeholders in the future.

This study is expected to contribute to the literature in the following ways. *First*, studies that discussed the relationship between risk management and external corporate funding, especially in developing countries, are still very limited. This study examined the association between ERM and cost of debt as the main source of funding for businesses in developing countries still focuses on debt financing (Caporale et al., 2018; Godlewski & Le, 2022). *Second*, this study also compares the relationship between ERM and cost of debt based on two recent time periods, namely the pre-pandemic period (2018–2019) and the pandemic period (2020–2021), which has never been explored in previous studies.

Nevertheless, this study also has several limitations. *First*, because hypothesis testing was carried out using balanced panel data, the observation periods used were relatively short (2 years before the pandemic and 2 years during the pandemic). This study excluded 2022 because the 2022 reports have not been fully available on the website of the Indonesian Stock Exchange (www.idx.co.id) and the websites of the observed companies at the time of data processing. Therefore, further studies are recommended to use a longer observation period. *Second*, there are two proxies commonly used in prior studies in measuring the effectiveness of ERM, namely S&P ERM Rating and ERMIndex/Abnormal ERMIndex based

on a study by Gordon et al. (2009). However, this study cannot use these two proxies because the S&P ERM Rating is only available for specific industries in developed countries (e.g. insurance and banking), while some components of ERMIndex are not available in the Datastream database (e.g. number of company employees) and companies in Indonesia rarely disclose material weaknesses and restatements in their annual reports. If possible, the use of both proxies in the sensitivity test of future studies is highly suggested. *Third*, due to limited data sources, this study only used a general proxy in calculating cost of debt, namely the ratio of interest costs to the average total debt. Thus, further studies with access to the Dealscan and Bloomberg databases can enrich the tests by using other cost of debt measurements (e.g. credit spread). *Lastly*, since this study only observed Indonesia as the sample country, the results cannot reflect conditions in other developing countries. Future studies can perform a cross-country (e.g. ASEAN countries) analysis to gain a more comprehensive overview of the situation and compare variations in ERM in developed and developing countries.

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Authors contributions

Wulan Rahmawati (1st author): This article is part of the first author's dissertation, where one of the aspects studied is ERM on Cost of Debt. The first author contributed to this article by conducting a literature review before designing the research model, writing the entire manuscript, collecting and processing data, and conducting data analysis and interpretation. **Sylvia Veronica Siregar (2nd author):** The second author of this article is the first author's chief dissertation promoter who contributed to the development of the research idea, critically revised the manuscript, provided advices during data processing, and gave final approval to the published version. **Elvia R. Shauki (3rd author):** The third author of this article is the first author's co-promoter-1 who contributed to the critical revision of the manuscript, provided advices on the storyline and theories used in this research, and gave final approval to the published version. **Viska Anggraita (4th author):** The fourth author of this article is the first author's co-promoter-2 who contributed to the critical revision of the manuscript, provided suggestions regarding the development of ERM measurements according to the COSO framework, ISO 31000, and the Indonesian context, and gave final approval to the published version. All authors have agreed to be accountable for all aspects of this article.

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Data availability statement

The data that support the findings of this study are available from the corresponding author [Wulan Rahmawati] upon reasonable request.

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