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The Impact of Debt Maturity Structure and Financial Leverage on Bankruptcy Risk of Real Estate Enterprises: Empirical Study in ASEAN Countries

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Abstract: When the world economy experiences unpredictable fluctuations, the real estate market is also significantly affected, leading to many risks in this field. Therefore, real estate businesses need to manage and use their capital effectively to avoid negative consequences in production and business activities, especially in dealing with the bankruptcy risk. This paper investigates the impact of debt maturity structure and financial leverage on the bankruptcy risk of 140 real estate enterprises in ASEAN countries in the period 2018-2022. Results indicate that financial leverage and debt maturity structure have a positive impact on the default risk of these real estate companies. Meanwhile, the net working capital to total assets ratio and the absolute liquidity ratio negatively affect companies' bankruptcy risk. Based on these results, the study proposes several recommendations for real estate businesses and state management agencies in ASEAN to lower bankruptcy risks and improve the operational efficiency of the real estate sector in this region.

Key words: debt maturity structure, financial leverage, bankruptcy risk, real estate
JEL codes: G32, G33, R30

1. Introduction

Real estate is considered a backbone and complex sector of the economy. It has close connections with many other economic and service industries, such as construction materials, brokerage, banking, etc.. Thus, real estate entails a massive workforce in these fields and industries. Real estate and the industries surrounding it are an economic ecosystem that resonates with each other. Currently, in ASEAN countries, the diversity in the development of the real estate market provides investment strategies, drives economic growth, and positively contributes to industrialization and urbanization progress. However, due to the impact of the global crisis, the real estate market has experienced many complicated fluctuations, leading to the birth and bankruptcy of a series of businesses in this field. The bankruptcy of corporations of real scale and reputation has created a need for managers to learn ways to manage risks for their companies. Further research on corporate operations in the same industry shows that companies are currently burdened with a substantial amount of debt that necessitates repayment, cannot accumulate capital, and many other reasons.

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Therefore, leverage is increasingly used flexibly by businesses, in many different forms to prevent and minimize the corporate default risk. While low leverage shows a vague positive relationship with bankruptcy risk, higher leverage has a stronger impact on whether a company or organization goes out of business (Nguyen & Vu, 2021). Besides, debt maturity is also a factor to consider, as companies often want to minimize short-term leverage because of its uncertainty, as well as reduce the business's internal cash flow due to pressure to repay short-term debt, though the profit factor it can bring is higher (Nguyen & Vu, 2021). Deb maturity, whether short or long-term, will affect bankruptcy risk in different ways. According to Cathcart et al. (2019), the effect of financial leverage on bankruptcy risk is different between small and large firms. The difference in bankruptcy probability between the highest and lowest leverage quantiles is 1.24% for large companies and 2.87% for small and medium-sized enterprises (SMEs). This difference can be explained by SMEs' greater exposure to short-term debt and, thus, higher refinancing risk. The authors find that SMEs that can recover from insolvency have similar leverage ratios as bankrupt SMEs. However, their liability structure has significantly shifted toward long-term debt and away from short-term debt. These findings have important implications for leverage and each component, including trade finance, short-term debt, and long-term debt, to influence the probability of default positively.

It is clear that studying the correlation between financial leverage and debt maturity structure to bankruptcy risk plays a vital role in preventing and minimizing the risk of default for businesses. Although there have been many theories and experiments on this correlation, for countries with young capital markets, for example, markets in developing countries such as ASEAN, whether the application of the framework and experience from developed economies are appropriate is still a question that needs to be solved. This paper aims to systematize and analyze the relationship between debt maturity structure, leverage, and bankruptcy risk of real estate businesses in ASEAN countries, thereby proposing some recommendations for real estate companies and management agencies to improve the quality of financial resource management and minimize the possibility of businesses going bankrupt.

2. Literature Review

2.1 Bankruptcy Risk

According to Beaver (1966), the criteria for determining a company's bankruptcy risk are being unable to repay debt, overdrafts on bank accounts, and skipping the payment of preferential dividends. Meanwhile, when conducting research in the US market, Altman (1968) assumed that the company fell into insolvency when it filed for bankruptcy. In another study by Pongsatat et al. (2004), a company is likely to go bankrupt when it is unable to continue its current business due to high debt obligations, meaning it has no financial potential for debt settlement, or when the company's net worth is negative, meaning the value of its assets is less than the value of its liabilities.

Previous literature shows that there is no exact definition of bankruptcy, but depending on the economic characteristics of each country, the perspectives on bankruptcy are also different. However, in general, the main cause of bankruptcy is a decline in solvency, meaning the business does not have enough money to pay off all debts to suppliers or interest on bank deposits and often breaches contracts.

Researchers use different analytical tools and techniques for each period to measure bankruptcy risk, such as comparison tools, traditional indices, Z-scores, technical statistics, etc. At first, the widely applied techniques were statistical techniques (Balcaen & Ooghe, 2006) such as statistical univariate models, deep multiplier analysis,

linear probability models, regression Logit, and Probit analysis (Ohlson, 1980). However, many studies have demonstrated that methods based on algorithmic data analysis for model building can be an alternative to classification problems when measuring bankruptcy risk (Atiya, 2001).

2.2 Financial Leverage

Financial leverage refers to using debt (borrowed capital) to make an investment or project instead of a business's equity. The result is to intensify the potential profits from a project. Vice versa, leverage will multiply the potential downside risk if the investment does not succeed. When one refers to a company, asset, or investment as "highly leveraged", it means the item has more debt than equity. Bongini et al. (2001) indicate that Asian companies went bankrupt because of high leverage and heavy investment in real estate and factories.

Using financial leverage, a company can increase its profits and stock value by investing in new projects or expanding its business operations. However, financial leverage can also lead to risks when the company cannot repay debt within the deadline or does not have enough financial resources to manage its liabilities. Financial leverage measurements are a tool to determine the probability of a business remaining or losing its ability to pay debt contracts. The more debt companies have, the higher their risk of being unable to fulfill their liability obligations. By analyzing financial leverage indicators, the company's ability to repay debt is demonstrated, thereby determining the risk of bankruptcy of that company. This study uses the total debt to total capital ratio to measure financial leverage. This indicator shows how much debt must be paid for each dollar of capital to finance a company's assets. The lower this indicator, the more proactive the company is, and vice versa.

2.3 Debt Maturity Structure

According to Pham (2017), every business seeking growth must possess sufficient capital. This capital is created from shareholders' equity and borrowed debt. Thus, the decision to choose capital from debt will depend on the debt maturity because tax-deductible debt can provide better financial resources than equity. Debt maturity is the payment term for short-term and long-term debt. The decision to select an optimal debt maturity will help businesses have many opportunities and reduce risks to financial resources, increase transparency, and enable firms to better capitalize on tax deductions for loans.

Signaling Theory was proposed by Jensen & Meckling (1976) based on information asymmetry and developed by Myers (1977). Debt maturity structure is considered a tool to resolve agency conflicts; businesses must provide signals about their current financial situation to ensure their ability to repay debt. Signals from asymmetric information imply that firms choose debt maturity as a signal to the market and that managers always have better information than outside investors about the company's financial health. Issuing short-term debt shows that businesses have good signals about the business financial situation (Diamond & Rajan, 2001; Flannery, 1986), as well as income fluctuations (Stohs & Mauer, 1996). According to Flannery (1986), high-risk borrowers often cannot afford short-term debt and prefer long-term debt, while low-risk borrowers prefer short-term debt. If there is an information asymmetry gap between the mobilizer and the sponsor, the company will use highly liquid assets instead of debt or equity (Myers & Majluf, 1984). On the other hand, businesses with sound finances will use more short-term debt when they can control the financial and interest rate risks of short-term debt (Jun & Jen, 2003).

2.4 The Relationship Between Debt Maturity Structure, Financial Leverage, and Bankruptcy Risk

The impact of financial leverage on a business' bankruptcy risk is a complex relationship, and there is interaction between them. Cathcart et al. (2019) prove that the impact of financial leverage on bankruptcy risk is significantly different between small and large enterprises. According to this study, the negative impact of financial leverage on the bankruptcy risk of small businesses is more significant than that of large businesses. This can be explained by the fact that large businesses often diversify their financial sources and use financial leverage more effectively.

Dirman (2020) pointed out that many factors affect a business' bankruptcy risk, including liquidity, profitability, financial leverage, size of the business, and free cash flow. In particular, financial leverage is considered one factor that greatly affects a business' bankruptcy risk. In addition, several studies have mentioned the relationship between financial leverage, bankruptcy risk, and the debt maturity structure of businesses. Pham (2017) concludes that the debt maturity structure of a business also affects bankruptcy risk. According to this study, businesses that use long-term debt, such as bonds and long-term bank loans, instead of short-term debt will minimize their bankruptcy risk. This means businesses using the proper financial structure, including a combination of financial leverage and appropriate debt maturity structure, will be more resistant to default risk.

While short-term debt reduces firms' internal cash flows, firms cannot raise external capital due to long-term debt burdens (Hart & Moore, 1995). These obstacles prevent companies from making new investments, leading to a higher likelihood of bankruptcy. Therefore, when increasing short-term or long-term debt, businesses pose a higher risk of bankruptcy (Nguyen & Vu, 2021). Also, according to Nguyen & Vu (2021), because interest rates on short-term debt are often lower than medium and long-term debt, businesses tend to choose short-term debt for medium and long-term investments. This is a case where the interest rate difference between short-term and long-term debt is relatively large. However, businesses using short-term debt are subject to turnover risk. In other words, these companies must renegotiate with lenders after each year of borrowing if they want to use these short-term loans for medium or long-term projects. If banks cut off these loans, medium- and long-term investments will stagnate or stop operating. From there, businesses will likely face the risk of bankruptcy.

3. Methodology

3.1 Research Model

Based on the theoretical basis, the study analyzes 06 factors belonging to 05 groups: financial leverage, debt term structure, profitability, solvency, and operational capacity. From there, the research will establish a regression model with the dependent and independent variables.

The theoretical model is proposed as follows:

$$ZScore_{i,t} = \alpha + \beta_1 FL_{i,t} + \beta_2 DMS_{i,t} + \beta_3 CR_{i,t} + \beta_4 QR_{i,t} + \beta_5 ALR_{i,t} + \beta_6 NWA_{i,t} + \varepsilon_i$$

In which:

ZScore: The company's bankruptcy risk

FL: Financial leverage

DMS: Debt maturity structure

CR: Current ratio

QR: Quick ratio

ALR: Absolute liquidity ratio

NWA: Net working capital to total assets

To measure the dependent variable-bankruptcy risk, the study applies the Z-Score formula according to Altman (1968) and Hotchkiss (1993). Accordingly, we calculate Z-Score for real estate businesses as follows:

$$Z\text{-Score} = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E \quad (1)$$

In which:

A = (Current assets - Current liabilities) / Total assets

B = Retained Earnings / Total Assets

C = EBIT / Total assets

D = Market Value of Equity / Total Liabilities

E = Sales / Total assets

Detailed explanations for the variables in the model are presented in Table 1.

Table 1 Variable Explanations

Variable name	Description	Calculation	References
ZScore	The company's bankruptcy risk	Refer to Equation (1)	Altman (1968), Hotchkiss (1995), Pongsatat et al. (2004)
FL	Financial leverage	Total liabilities divided by total assets	Bongini et al. (2001), Nguyen & Vu (2021)
DMS	Debt maturity structure	Current liabilities divided by the total of current and non-current liabilities	Pham (2017), Nguyen & Vu (2021)
CR	Current ratio	Current assets divided by current liabilities	Phan et al. (2022)
QR	Quick ratio	(Current assets — Inventories) / Current liabilities	Phan et al. (2022)
ALR	Absolute liquidity ratio	Total assets divided by total liabilities	Phan et al. (2022)
NWA	Net working capital to total assets	Net working capital divided by total assets	Phan et al. (2022)

3.2 Data and Sample Selection

The data used in the study is balance sheet data collected from 140 real estate companies in several Southeast Asian countries during the period 2018-2022, with a total number of observations of 700. These data are collected from the S&P Global database from 2018 to 2022. Thus, the accuracy and reliability are guaranteed.

For the purpose of researching the impact of debt maturity structure and leverage on the bankruptcy risk of real estate companies, the author collected necessary statistics indicators. The data collection period is 2018-2022, which focuses on businesses having an accounting period that coincides with the calendar year (starts on January 1st and ends on December 31st) and having a complete and appropriate data set for the study's purpose. A valid research sample selected includes 140 real estate companies operating in 7 Southeast Asian countries, namely 25 companies in Vietnam, 48 companies in Thailand, 13 companies in Indonesia, 4 companies in the Philippines, 34 companies in Singapore, 15 companies in Malaysia, and 1 company in Cambodia. The remaining three countries in the ASEAN region, including Myanmar, Laos, and Brunei, were not included in the research sample because these countries lack a lot of data that meet the requirements of the research model.

4. Results

4.1 Overview of the Current Status of Bankruptcy Risk of Real Estate Businesses in the ASEAN Region

A summary of the results of calculating the Z-Score, an index measuring bankruptcy risk, of real estate

businesses operating in ASEAN countries during the period from 2018 to 2022 is illustrated in Table 2.

Table 2 Z-Score of Real Estate Businesses in Southeast Asia in the Period 2018 to 2022

Country	2018	2019	2020	2021	2022	Average
Vietnam	2.6125	2.8536	2.4094	3.3118	4.5773	3.1529
Malaysia	1.1569	1.1196	0.8293	0.8117	0.8060	0.9447
Singapore	0.6576	0.6690	0.4217	0.5314	0.5420	0.5643
Thailand	1.8591	1.7584	1.5595	1.6845	1.6792	1.7081
Indonesia	2.4374	2.2144	1.9049	2.4134	2.5810	2.3102
Philippines	3.5910	4.3471	3.5937	3.1756	3.3919	3.6199
Cambodia	0.5502	1.8859	1.1478	1.1639	0.9704	1.1436

Z-Score calculation results suggest that the risk of bankruptcy in real estate businesses in Vietnam, Indonesia, and the Philippines is very low. Despite significant fluctuations in index calculations from year to year, companies in these countries generally have expected economic index sets, leading to Z-Score calculations being positive and consistently above the safe level, with the Philippines having the highest average Z-Score during the period (3.62), followed by Vietnam and Indonesia with 3.15 and 2.3, respectively. Moreover, Thailand is a country where real estate businesses have an average Z-Score index (about 1.71), which shows that the risk of bankruptcy is approaching an appropriate level.

The countries whose Z-Score calculation results indicate a high risk of bankruptcy are Malaysia, Singapore, and Cambodia. Businesses in these countries tend to have unstable Z-scores, and the average results are much lower than other countries, showing a clearer risk of bankruptcy. The businesses with the most positive Z-Score index in these three countries are from Cambodia, with an average index from 2018 to 2022 of 1.14; the following are businesses from Malaysia with 0.94 and Singapore with 0.56.

4.2 Empirical Results

4.2.1 Descriptive Statistics

Descriptive statistics of the variables are presented in Table 3, including mean values, standard deviations, minimum values, and maximum values.

Table 3 Descriptive Statistics

Variable	Number of observations	Mean	Standard deviation	Min	Max
Z-Score	616	1. 881014	2.467236	-1.257727	22.6639
FL	700	0.3269174	0.1537222	0	0.7164042
DMS	691	1.016738	1.331467	0.0143762	11.72904
CR	700	2.139634	1.603385	0.044843	14.45778
QR	700	0.9189723	0.9733999	0.0255255	9.367493
ALR	679	4.204439	5.224199	1.39586	81.14078
NWA	700	0.208144	0.2286704	-0.4651119	0.7894098

Source: Extracted from analysis results of STATA 14

The Z-Score variable (bankruptcy risk) has an average value of 1.88. The standard deviation is 2.46, and the difference is from -1.25 to 22.66, which shows that the dissimilarity between companies is quite large. The financial leverage (FL) variable has a mean of 0.32, indicating that most real estate companies in ASEAN own

more assets than liabilities. The standard deviation is 0.15, and the range from 0 to 0.71 shows similarities in industry concentration over the study period. The debt maturity structure (DMS) variable has an average value of 1.01. In the sample, some companies do not use long-term debt in the specific debt structure because DMS varies strongly from 0.01 to 11.72. In addition, it can be seen that real estate companies in Southeast Asia use more short-term debt for financing than long-term debt. Regarding the control variables, most of the variables generally have quite large variations, except for the NWA variable.

4.2.2 Correlation Analysis

The correlation coefficient indicates the relationship between variables in the model (Galton, 1880). According to Table 4, all of the correlation coefficients are less than 0.8, so there is no significant cross-correlation between variables in the model that affects the estimation results.

Table 4 Correlation

	ZScore	FL	DMS	CR	QR	ALR	NWA
ZScore	1.0000						
FL	-0.3291	1.0000					
DMS	0.3389	-0.4541	1.0000				
CR	0.1873	-0.1892	-0.0852	1.0000			
QR	0.1216	-0.3208	-0.0642	0.5664	1.0000		
ALR	0.5063	-0.6011	0.7352	0.1219	0.2278	1.0000	
NWA	0.2476	-0.0297	0.1061	0.6542	0.1215	0.0626	1.0000

Source: Extracted from analysis results of STATA 14

4.2.3 Regression Analysis

First, the author tested three regression models — pooled ordinary least square (OLS), fixed-effect model (FEM), and random-effect model (REM) — to select the most optimal model. The regression results of the three models are shown in Table 5.

Table 5 Regression Results of POLS, FEM, and REM Models

Variable	POLS	REM	FEM
FL	-0.9852	-1.4079**	-2.4990***
	(0.6393)	(0.6561)	(0.7970)
DMS	-0.3050***	-0.2013*	-0.2304*
	(0.1112)	(0.1049)	(0.1265)
CR	-0.0941	-0.0294	-0.0350
	(0.0840)	(0.0668)	(0.0717)
QR	-0.0879	-0.0824	-0.0115
	(0.1129)	(0.0936)	(0.1041)
ALR	0.3059***	0.3426***	0.3637***
	(0.0311)	(0.0265)	(0.0303)
NWA	2.5977***	1.7463***	1.0417*
	(0.4853)	(0.4705)	(0.5995)
Constant	0.8660	0.7353	1.2242
N	603	603	603
R-square	0.3138	0.4572	0.4616
Prob>F	0.0000	0.0000	0.0000

The number in parentheses represents the standard error of the regression coefficient. The symbols ***,**,* represent the 1%, 5%, and 10% significance levels, respectively.

Source: Extracted from analysis results of STATA 14

The study performs tests to select the most appropriate model. The Breusch-Pagan Lagrange (LM) test concludes that REM is more effective than the POLS model. The Hausman test concludes that FEM is more effective than REM. The F-test with a p-value lower than 0.05 also shows that FEM is more suitable than the OLS model. Thus, the Breusch-Pagan Lagrange (LM) test, Hausman test and F-test concluded that the fixed-effect model is more suitable and effective than the OLS and random-effect models.

Next, the study conducted testing for defects in the model. The test results show that the fixed-effect model has heteroskedasticity and autocorrelation. In addition, the study also tested multicollinearity via the variance inflation factor (VIF); the results showed that the coefficients are less than 10 with an average value of 2.49 (Table 6), which indicates that the model has a low level of multicollinearity, which does not affect the model's estimation results.

Table 6 VIF Coefficient

Variable	VIF	1/VIF
CR	3.28	0.3048
ALR	3.00	0.3329
DMS	2.77	0.3606
NWR	2.30	0.4354
QR	1.91	0.5231
FL	1.70	0.5872
Mean	2.49	

Source: Extracted from analysis results of STATA 14

After running tests to correct the model's defects, the final results of the fixed-effect model are described as follows:

Table 7 FEM Results After Defect Correction

Variable	Coefficient (β)	p-value
FL	-2.4990**	0.028
DMS	-0.2304**	0.037
CR	-0.0350	0.290
QR	-0.0115	0.889
ALR	0.3637***	0.000
NWA	1.0417***	0.007
Constant (α)	1.2242**	0.015
N	603	
R-square	0.4616	

The number in parentheses represents the standard error of the regression coefficient. The symbols ***, **, * represent the 1%, 5%, and 10% significance levels, respectively.

Source: Extracted from analysis results of STATA 14

From the table, it can be seen that Rsquare = 0.4616 thus the independent variables explain 46.16% of the dependent variable. In addition, the relationship between the variables can be generalized as follows:

$$ZScore = 1.224196 – 2.499028FL – 0.2304466DMS + 0.3636648ALR + 1.041733NWA$$

The above results show that Financial Leverage (DL) and Debt Maturity Structure (DMS) both have a negative impact on Z-Score, which means that the company may be at higher risk of financial distress or

bankruptcy as financial leverage increases. Furthermore, when a company has many short-term debts in its debt maturity structure, the ratio of these debts will increase, leading to a decline in the company's ability to repay debt, and the risk of bankruptcy will rise. These results are relatively consistent with some previous studies, such as the research of Phan et al. (2022), Nguyen (2018), Hoang (2011), and Beaver (1966).

Meanwhile, the absolute liquidity ratio (ALR) and net working capital to total assets ratio (NWA) positively affect Z-Score. When a company has a higher absolute liquidity ratio (higher level of assets compared to liabilities), the company's ability to repay debt will be better, and the risk of bankruptcy will decrease. In contrast, when a company has a lower absolute liquidity ratio (lower level of assets compared to liabilities), the firm's capability to repay debt will be poorer, and the bankruptcy risk will increase. However, this finding is relatively contrary to previous research results by Phan et al. (2022) and Vo (2020).

The impact of NWA reflects that when a company has a higher net working capital to total assets ratio, the company's ability to repay debt will be enhanced, and the default risk will be lower. This result is similar to studies such as Bandyopadhyay (2006), Altman (1968), and Nguyen (2018).

In general, the results of empirical research according to the multivariate linear regression model show that when all six variables (FL; DMS; CR; QR; ALR; NWA) are included in the model, four variables — DTA; DMS; ALR; NWA — have a significant impact on the bankruptcy risk of real estate companies, CR and QR indicators do not have a significant relationship with the bankruptcy risk of real estate companies.

5. Conclusion and Recommendations

In a volatile and competitive real estate market, capital and financial risk management is an essential factor for real estate enterprises. Debt maturity structure and financial leverage are two concepts related to using debt to finance real estate companies' business activities. Real estate companies need to choose a debt maturity structure and financial leverage appropriate to their business conditions to minimize bankruptcy risk and increase company value. By analyzing data from real estate companies from ASEAN countries in the period 2018-2022, results show that the more short-term debt and liabilities real estate businesses use, the higher the company's bankruptcy risk. The reason is that short-term debt has higher borrowing costs and greater payment pressure than long-term debt. In addition, debt has higher borrowing costs than equity and more stringent payment conditions. From these results, the study proposes some recommendations for real estate companies in ASEAN. First, to minimize the impacts of financial leverage on bankruptcy risk, businesses need to have strategies to use appropriate leverage, invest by market needs, and use transparent loans with carefully calculated loan sizes, thereby achieving growth and minimizing bankruptcy risks. Moreover, businesses should consider the terms and size of their loans and flexibly and reasonably use short-term and long-term loans while increasing profitability from loans and maintaining the ability to pay debt on time. In addition to efforts to improve the real estate market situation from companies, to ensure conditions to help this market develop, it is necessary to obtain support from policies, guidelines, and guidelines from the state and government along with specific solutions such as perfecting the legal framework to support real estate businesses; focus on handling and resolving issues that affect the healthy development of the real estate market, under the actual situation in the locality; implement financial support measures such as debt postponement and debt rescheduling for a certain period according to regulations to help businesses in difficulty receive liquidity support and avoid sudden bankruptcy. In addition to the results, the study also has some limitations that future research need to consider to clarify, such as expanding the time and country

scope. Moreover, there are other variables that can affect corporate bankruptcy risks but did not include in the model such as: payment capacity, corporate income tax, company size, growth opportunities, profit volatility, asset structure... Due to time constraints, the study was not able to use more advanced estimation methods such as GMM, or considering the impact of lagged independent variables, which is also a direction for further research. Additionally, future studies should also expand the approach, for example, analyzing more deeply the role of financial constraints or dividing the research sample into different types, such as state-owned enterprises and non-state-owned enterprises, to provide more comprehensive perspectives for the research topic.

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