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Revisiting the trade-off theory: the role of liquidity in profitability outcomes. evidence from Southeast Asia

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Abstract

This study examines the relationship between capital structure, liquidity, and profitability within the Trade-Off Theory's framework, focusing on firms operating in Southeast Asia. Utilizing various regression models, the research identifies a positive relationship between capital structure and profitability, measured as either return on assets (ROA) or net profit margin (NPM), supporting the Trade-Off Theory's premise that debt financing can enhance firm performance. Liquidity, represented by the current ratio (CR) or cash ratio (CASH), not only positively impacts profitability but also mitigates the effect of leverage, highlighting its dual role as a stabilizer and constraint. The addition of macroeconomic control variables, such as GDP growth, inflation, and firm size greatly enhances the models' ability to explain variations in corporate financial performance, highlighting the importance of the regional economic context. Additionally, return on assets (ROA) proves to be a more thorough measure of profitability compared to net profit margin (NPM), as indicated by higher R^2 values. This research advances the Trade-Off Theory by incorporating liquidity as a vital moderator in the relationship between capital structure and profitability, providing valuable insights into how financial strategies interact with macroeconomic conditions in the Southeast Asian corporate environment.

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Keywords

Trade-off theory, Capital structure, Profitability, Liquidity, Southeast Asia

Introduction

The Trade-Off Theory, which is based on the foundational work of Modigliani & Miller (1958), mainly examines the balance between debt and equity to find the optimal capital structure and profitability [1]. While the relationship between capital structure and profitability is crucial, the significance of liquidity in maintaining financial stability and operational continuity has not been thoroughly addressed. Even if it benefits shareholders, issuing debt can negatively impact profitability if there isn't enough

liquidity to cover obligations [2]. Liquidity and financial flexibility are important for firm stability, yet traditional frameworks often overlook liquidity as a key factor in determining capital structure [3]-[4].

Modigliani's refinement of the Trade-Off Theory in 1963 introduced the tax shield as an important element, enhancing the theoretical framework [5]. Some recent studies demonstrate a positive relationship between capital structure decisions and profitability [6]-[10], while some others present opposing findings, indicating that higher capital structure can sometimes negatively affect profitability due to insufficient liquidity [2]-[11]-[12]. This discrepancy highlights the necessity for a more thorough framework that includes liquidity as a protective measure against financial distress.

Liquidity is essential for a firm's ability to handle financial challenges and maintain stability in unpredictable economic conditions. It not only indicates how well assets are managed to meet day-to-day operation but also shows the company's strength during financial crises or emergencies [13]. Higher liquidity levels can lower the chances of financial distress [14]. However, having high liquidity doesn't always ensure stability, as some current assets might not be easily converted into cash, making it harder for the company to fulfill immediate obligations [15].

The dynamic relationship between capital structure, liquidity, and profitability has become particularly evident in Southeast Asian economies. During the COVID-19 pandemic, firms in the Southeast Asia region faced significant liquidity challenges, revealing weaknesses in their capital structures [6]. These difficulties underscore the increasing importance of liquidity in reducing insolvency risks and maintaining profitability in uncertain economic conditions. The unique structural and economic features of Southeast Asia, characterized by increased volatility, differences in access to credit, and varying degrees of financial inclusion, further highlight the critical role of effective liquidity management [16].

This study aims to bridge the gap in the existing literature by explicitly integrating liquidity into the Trade-Off Theory as a determinant of profitability and a safeguard against financial distress. By focusing on Southeast Asian economies, this research extends the theoretical framework to address the unique challenges posed by high economic volatility and structural disparities in the region. The findings are expected to contribute to academic discourse and provide actionable insights for firms and policymakers, helping them optimize capital structure decisions in dynamic and complex markets.

Methods

Data Collection

This research uses a quantitative method by collecting data from firms in Southeast Asia from 2002 until 2021. The sample was chosen using a purposive sampling method based on these criteria: 1) firms based in Southeast Asia from 2002 to 2021, 2) firms that are

neither banking nor financial, and 3) firms that consistently published annual reports during the 2002–2021 period. Based on the defined criteria, the dataset includes 407 firms, culminating in a total sample of 8140 observations.

Variables

This study's dependent variable is profitability proxied by return on assets (ROA) and net profit margin (NPM). The independent variable of this study is capital structure, measured by debt-to-equity ratio (DER). The moderating variable is liquidity with the current ratio (CR) and cash ratio (CASH) as its proxy. The control variables included such as gross domestic product growth (GDP), inflation (INF), and firm size (LNTA). Table 1 shows the measurement of each research variable.

Table 1. Variables Measurement

Variable	Proxy	Formula	Source
	Dependent Variables		
Profitability	Return on Assets (ROA)	ROA = $\frac{Net\ income}{Total\ Assets}$	[9]
	Net Profit Margin	NPM = $\frac{Net\ income}{Total\ Sales}$	[14]
	Independent Variables		
Capital Structure	Debt to Equity Ratio (DER)	DER = $\frac{Total\ Longterm\ Debt}{Total\ Equity}$	[17]
	Moderating Variable		
Liquidity	Current Ratio (CR)	CR = $\frac{Current\ Asset}{Current\ Liability}$	[16]
	Cash Ratio (Cash)	Cash = $\frac{Cash}{Current\ Liability}$	[4]
	Control Variables		
GDP Growth	GDP Growth	GDP = $\frac{GDP_t}{GDP_{t-1}} - 1$	[6]
Inflation	Inflation rate		[6]
Firms Size	Total Assets	*Ln(TA)*	[18]

Analysis Method

The dataset was analyzed using panel data analysis. The steps are: 1) creating the regression model, 2) determining the best estimation model, and 3) hypothesis testing. As the previous study [5]-[8]-[10]-[12], by combining each proxy of the dependent, independent, and moderating variable, the regression model is presented with the following formula:

$$ROA_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CR_{it} - \beta_3 DER_{it} * CR_{it} + \varepsilon_{it} \quad (1A)$$

$$ROA_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CR_{it} - \beta_3 DER_{it} * CR_{it} + \beta_4 GDP_{it} + \beta_5 INF_{it} + \beta_6 LNTA_{it} + \varepsilon_{it} \quad (1B)$$

$$ROA_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CASH_{it} - \beta_3 DER_{it} * CASH_{it} + \varepsilon_{it} \quad (2A)$$

$$ROA_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CASH_{it} - \beta_3 DER_{it} * CASH_{it} + \beta_4 GDP_{it} + \beta_5 INF_{it} + \beta_6 LNTA_{it} + \varepsilon_{it} \quad (2B)$$

$$NPM_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CR_{it} - \beta_3 DER_{it} * CR_{it} + \varepsilon_{it} \quad (3A)$$

$$NPM_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CR_{it} - \beta_3 DER_{it} * CR_{it} + \beta_4 GDP_{it} + \beta_5 INF_{it} + \beta_6 LNTA_{it} + \varepsilon_{it} \quad (3B)$$

$$NPM_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CASH_{it} - \beta_3 DER_{it} * CASH_{it} + \varepsilon_{it} \quad (4A)$$

$$NPM_{it} = \beta_0 - \beta_1 DER_{it} + \beta_2 CASH_{it} - \beta_3 DER_{it} * CASH_{it} + \beta_4 GDP_{it} + \beta_5 INF_{it} + \beta_6 LNTA_{it} + \varepsilon_{it} \quad (4B)$$

Where i and t denote firm and time, respectively. ROAit and NPMit are the proxies for the firm performance variable. While DERit is the main explanatory variable in this study. CRit and CASHit are the moderating variables proxies. GDPit, INFit, and LNTAit are the proxies for control variables. β denotes the estimated coefficients, while εit is the error term.

To choose the right panel data estimation model among the common effect model (CEM), fixed effect model (FEM), and random effect model (REM), several tests are performed. The Chow test compares the fixed effect model with the common effect model. If the p-value is less than 0.05, the fixed effect model is preferred, otherwise, the common effect model is used. Then, the Hausman test is conducted to choose between the fixed effect model and the random effect model. A p-value below 0.05 indicates a preference for the fixed effect model, while a value above 0.05 suggests the random effect model is more appropriate. Lastly, the Breusch-Pagan test is utilized to distinguish between the random effect model and the common effect model. If the p-value is less than 0.05, the random effect model is chosen, if the p-value is greater than 0.05, the common effect model is preferred.

Results and Discussion

Descriptive Statistics

The data analysis reveals that firm profitability, as measured by return on assets (ROA) and net profit margin (NPM), shows moderate averages with significant variability among firms, indicating differences in performance. As shown in Table 2, the average ROA is observed at 3.8%, reflecting moderate consistency in asset profitability, as evidenced by the relatively low standard deviation. On the other hand, the average NPM is 6.4%, with a higher standard deviation, indicating a greater dispersion in profit margins among the firms studied. Capital structure, represented by the debt-to-equity ratio (DER), also displays high variability, suggesting diverse capital structure levels. DER exhibits an average of 41.3%, coupled with a high standard deviation, which points out the significant variability in capital structure across the sample. Liquidity measures such as current ratio (CR) and cash ratio (CASH) indicate differences in short-term financial health. The CR averages at 1.613, suggesting that firms generally possess sufficient current assets to meet their current liabilities, though the range reveals considerable differences in liquidity levels. The CASH, averaging 41.4%, also demonstrates variability, highlighting disparities in the cash reserves held by different firms. The data also shows how economic conditions are changing, with varying GDP growth and inflation rates, as well as a range of firm sizes represented by the natural log of total assets (LNTA). The average GDP growth rate is 4.374%, indicating a period of moderate economic expansion, though there are fluctuations that reflect different economic conditions over time. The inflation rate, which averages 2.634%, shows significant variability, pointing to times of both high and low inflation. Finally, the mean value of the LNTA is 12.560, representing the logarithmic scale of firm size, while the standard deviation

highlights the diversity of sizes within the dataset. This detailed overview emphasizes the complex interactions between profitability, capital structure, liquidity, and macroeconomic factors that influence firm performance (Table 2).

Table 2. Descriptive Statistics

Variables	N	Mean	Median	Maximum	Minimum	Std. Dev
ROA	8140	0.038	0.036	0.562	-0.499	0.071
NPM	8140	0.064	0.055	5.399	-7.686	0.284
DER	8140	0.413	0.243	27.858	-27.999	1.192
CR	8140	1.613	1.419	6.567	0.012	0.878
CASH	8140	0.414	0.260	3.217	0.000	0.445
GDP	8140	4.374	5.019	14.520	-9.518	3.120
INF	8140	2.634	2.105	23.115	-1.139	2.457
LNTA	8140	12.560	12.345	18.338	6.179	1.791

Source: Eviews 12 output, by researcher

Model Estimation

The best estimation model for each regression model was determined by using the Chow, Hausman, and Breusch-Pagan tests. The results can be found in Table 3.

Table 3. Model Estimation

Model	Chow	Hausman	Breusch-pagan	Model Decided
Model 1A (ROA, DER, CR)	0.0000	0.0122		FEM
Model 1B (ROA, DER, CR, GDP, INF, LNTA)	0.0000	0.0000		FEM
Model 2A (ROA, DER, CASH)	0.0000	0.3556	0.0000	REM
Model 2B (ROA, DER, CASH, GDP, INF, LNTA)	0.0000	0.0000		FEM
Model 3A (NPM, DER, CR)	0.0000	0.2806	0.0000	REM
Model 3B (NPM, DER, CR, GDP, INF, LNTA)	0.0000	0.0105		FEM
Model 4A (NPM, DER, CASH)	0.0000	0.0684	0.0000	REM
Model 4B (NPM, DER, CASH, GDP, INF, LNTA)	0.0000	0.0410		FEM

Source: Eviews 12 output, by researcher

Table 3 illustrates the variability of the optimal model for each regression model used in this study. In the case of Model 1A, the probability value from the Chow test is 0.0000, which is below the 0.05 threshold. This result prompts the choice of the FEM instead of the CEM. The Hausman test then conducted, and the probability value is 0.0122, also below 0.05, confirms the preference for FEM over the REM. So, the final decision for model 1A is FEM. Similarly, model 1B, with Chow and Hausman test probability values at 0.0000, also prefers FEM as the best model. In Model 2A, while the Chow test's probability of 0.0000 favors FEM over CEM, the Hausman test's probability value of 0.3556 is above 0.05 threshold, suggesting REM is more appropriate than FEM. This choice is further validated by the Breusch-Pagan test's probability value of 0.0000, which indicates REM is the best estimation model for model 2A. For Model 2B, both the Chow and Hausman tests at 0.0000 favor FEM. Model 3A follows a similar pattern where the Chow test's probability of 0.0000 leads to FEM, but the Hausman test's probability of 0.2806 indicates REM, further supported by the Breusch-Pagan test's 0.0000 value. Model 3B's Chow and Hausman test values of 0.0000 and 0.0105, respectively, confirm FEM. In Model 4A, while the Chow test at 0.0000 endorses FEM, the Hausman test's

value of 0.0684 and the Breusch-Pagan test's 0.0000 probability favor REM. Lastly, for Model 4B, the Chow test's 0.0000 and Hausman test's 0.0410 probability values endorse the selection of FEM.

Hypothesis Testing

Table 4 and Table 5 present the results of various regression models examining the relations between capital structure, liquidity, and profitability.

Table 4. Regression Analysis Model 1 and Model 2

	Model 1				Model 2			
	ROA		ROA		ROA		ROA	
DER	0.00458 (0.00000)	***	0.00490 (0.00000)	***	0.00185 (0.00780)	***	0.00195 (0.00480)	***
CR	0.02098 (0.00000)	***	0.02144 (0.00000)	***				
CASH					0.03631 (0.00000)	***	0.03678 (0.00000)	***
DERCR	-0.00579 (0.00000)	***	-0.00614 (0.00000)	***				
DERCASH					-0.01422 (0.00000)	***	-0.01545 (0.00000)	***
GDP			0.00270 (0.00000)	***			0.00270 (0.00000)	***
INF			0.00105 (0.00280)	***			0.00098 (0.00520)	***
LNTA			0.00283 (0.00830)	***			0.00204 (0.05890)	*
C	0.00627 (0.00080)	***	-0.04455 (0.00140)	***	0.02497 (0.00000)	***	-0.01513 (0.27840)	
F-stat	11.24257 (0.00000)	***	11.89971 (0.00000)	***	102.11060 (0.00000)	***	11.54960 (0.00000)	***
OBS	8140		8140		8140		8140	
R2	0.37298		0.38819		0.03629		0.38112	

Note: * p<0.1, ** p<0.05, *** p<0.01

Source: Eviews 12 output, by researcher

Model 1A demonstrates that profitability (ROA) is positively influenced by capital structure (DER) and liquidity (CR) using fixed effect model, both significant at 1% level. Additionally, liquidity (CR) weakens the positive effect of capital structure on profitability. Model 1B includes control variables (GDP, INF, and LNTA), the results are similar, and confirm that GDP, INF, and LNTA significantly impact profitability. Model 2A replaces CR with CASH, and uses a random effect model instead. This model reveals similar findings, capital structure (DER) and liquidity (CASH) positively influence profitability (ROA), and liquidity (CASH) weakens capital structure's effect, all significant at the 1% level. Model 2B, using a fixed effect model with additional control variables, also supports these conclusions.

Table 5. Regression Analysis Model 3 and Model 4

	Model 3				Model 4			
	A. NPM		B. NPM		A. NPM		B. NPM	
DER	0.02127 (0.00000)	***	0.02199 (0.00000)	***	0.01722 (0.00000)	***	0.01771 (0.00000)	***
CR	0.05217 (0.00000)	***	0.05673 (0.00000)	***				
CASH					0.10695 (0.00000)	***	0.10404 (0.00000)	***
DERCR	-0.01270 (0.00080)	***	-0.01489 (0.00010)	***				
DERCASH					-0.04764 (0.00000)	***	-0.05764 (0.00000)	***
GDP			0.00682 (0.00000)	***			0.00683 (0.00000)	***
INF			0.00392 (0.01310)	**			0.00386 (0.01470)	**
LNTA			0.01846 (0.00010)	***			0.01650 (0.00070)	***
C	-0.02119 (0.02160)	**	-0.29949 (0.00000)	***	0.02029 (0.00280)	***	-0.22435 (0.00040)	***
F-stat	50.51152 (0.00000)	***	4.87803 (0.00000)	***	53.33390 (0.00000)	***	4.83241 (0.00000)	***
OBS	8140		8140		8140		8140	
R2	0.01829		0.20641		0.01929		0.20487	

Note: * p<0.1, ** p<0.05, *** p<0.01
Source: Eviews 12 output, by researcher

Models 3A and 4A, substitute DER with NPM as the proxy of profitability, while using the random effect and fixed effect approach respectively. The results are consistent, indicating that capital structure (DER) and liquidity (CR or CASH) positively affect profitability (NPM), with liquidity weakening the positive effect of capital structure. The control variables in models 3B and 4B also significantly influence profitability. Overall, the analysis shows that both capital structure and liquidity positively impact profitability, but liquidity diminishes the effect of capital structure. The macroeconomic factors (GDP and INF) and firm-specific factors (LNTA) also play a significant role. In addition, table 5 and 6 also show that the F-statistic probability value for all models is smaller than 0,05 indicating that capital structure and liquidity simultaneously affect a firm's profitability.

The differences among the models' R^2 show that they have varying levels of explanatory power regarding profitability measures. In particular, the models that use return on assets (ROA) as a measure of profitability tend to have higher R^2 values than those that rely on net profit margin (NPM). This indicates that the variables in the ROA models are better at explaining the changes in profitability and effectiveness indicators of a firm's profitability in this scenario. On the other hand, the lower R^2 values in the NPM models suggest that these variables explain less of the variability in profitability, pointing to the more intricate nature of profit margins, which may be influenced by a wider array of factors not included in these models.

The differences in the coefficient of determination (R^2) between the models are also captured in the utilization of control variables. The models tend to have higher R^2 values

than those that do not. This suggests that adding control variables significantly improves the models' capacity to account for the variability in profitability. Control variables help capture additional factors that affect profitability, leading to a more thorough understanding and enhancing the model's explanatory strength. As a result, models that lack control variables might overlook important determinants of profitability, leading to lower R^2 values and a weaker interpretation of the financial relationships at play.

Discussion

This study clearly shows a consistent relationship between capital structure, liquidity, and profitability, with detailed effects that enhance existing theoretical and empirical frameworks. The findings indicate that capital structure (DER) and liquidity (CR or CASH) positively impact profitability (ROA or NPM), supporting the Trade-Off Theory's core idea that firms weigh the costs and benefits of debt to improve financial performance [1]-[5]-[19]. The positive relationship between capital structure and profitability is consistent with the conclusions of previous studies [6]-[10]-[20]. However, liquidity also moderates this relationship and supports the existence of the Trade-off Theory. Excessive liquidity may reduce the positive impact of capital structure, indicating inefficient capital allocation and highlighting a trade-off between liquidity and profitability optimization [14]-[15].

The higher R^2 values in models that utilize ROA over NPM indicate that ROA serves as a more thorough measure of firm profitability in context efficiency and asset utilization, reflecting the capital structure and liquidity management [20]. On the other hand, the lower explanatory power of models based on NPM may stem from the complexities of profit margins, which are affected by a wider array of factors, including pricing strategies, cost structures, and market dynamics [14]. Incorporating control variables like GDP growth, inflation, and firm size significantly boosts the Profitability of the models' explanatory power, as shown by the increased R^2 values. This highlighted the influence of macroeconomic factors and firm-specific factors on firm performance [11]-[18].

The findings extend the Trade-Off Theory by adding liquidity as an essential factor influencing profitability and moderating the effects of capital structure. This integration offers a more comprehensive framework for analyzing capital structure choices in the dynamic and volatile contexts encountered by firms in Southeast Asia. In practice, the results indicate that companies need to strike a balance between liquidity and capital structure to maximize profitability while ensuring financial stability. Additionally, policymakers should take these dynamics into account when formulating regulations aimed at fostering corporate stability and growth.

Conclusion

This study examines the interconnectedness of capital structure, liquidity, and profitability, highlighting how both capital structure and liquidity positively influence profitability, with liquidity moderating the impact of capital structure. Key findings indicate that the Debt-to-Equity Ratio (DER) enhances profitability (ROA or NPM) in line with the Trade-Off Theory, while liquidity (CR or CASH) further boosts profitability but limits the positive effects of capital structure. The inclusion of macroeconomic variables such as GDP growth, inflation, and firm size enhances the explanatory power of the models, underscoring the broader economic environment's significance. ROA is identified as a more reliable profitability measure than NPM. The study provides empirical evidence from Southeast Asian firms, offering valuable insights for both scholars and industry professionals, and emphasizes the need for balanced financial strategies and supportive regulatory frameworks. It also identifies areas for future research, including sector-specific dynamics and alternative profitability and liquidity measures.

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