

Capital Structure Determinants: Evidence in Indonesia Food Processing Firms

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Abstract

This study examines the determinants of capital structure. Leverage is measured by debt-to-equity ratio and decompose to three regression models: short-term debt, long-term debt, and total debt. The purpose of this study is to test whether there are differences in the capital structure determinants across three debt regression models. The sample consists of 13 food processing firms publicly traded on the Indonesia Stock Exchange during the period 2015–2024. Panel regression tests indicate that the fixed effects model is the appropriate model for all three debt regression models. The adjusted r-squared is highest for long-term debt regression model which is 80,66% and short-term debt model has the lowest which is 59,3%, while total debt regression model has adjusted r-square of 76,91% The study finds that significant determinants differ across the various debt measures. Asset tangibility and non-debt tax shields are significant determinants in all three models, and the signs consistent with theoretical expectations. Intangible assets and growth opportunities are significant only for the long-term and total debt regression models. Firm size is a significant determinant in the short-term and total debt regression models. Uniqueness is found to be significant only in the long-term debt regression model. The findings of this research support the agency cost theory, that increasing value of collateralizable assets will reduce the risk of wealth transfer from creditor to shareholders as debt increases. It also confirms the trade-off theory that firms tend to utilize less debt when they benefit from non-debt tax shields as substitute for tax advantage of debt financing. Intangible assets are found to complement tangible assets in facilitating access to long-term and total debt and support the signaling theory. Size significance supports the trade-off theory which confirms that large firms borrow more since they have lower agency cost. The significance of growth opportunities aligns with pecking order theory for long-term debt and total debt, indicating that high growth firms will use more debt to fund growth because of the less impact of asymmetric information. Furthermore, firms facing high costs associated with uniqueness tend to reduce their debt levels to minimize liquidation costs.

Keywords: tangible asset, intangible asset, firm size, growth opportunities, uniqueness, trade off theory, agency cost theory.

1. Introduction

This paper is aimed to analyze the determinants of capital structure. We focus on addressing the question of two questions: (1) is there any differences of capital structure determinants over short-term debt, long-term debt, and total debt; and (2) what are the capital structure theories supports the use of each type of debt. Research in capital structure determinants concerning short-term and

long-term debt has been found in Titman & Wessels (1988), Chittenden et al. (1996), Song (2005), Matias & Salsa (2016), Michaelas et al. (1999), Bevan & Danbolt (2004). The distinction on short-term and long-term debt as capital structure measurements has theoretical consideration. High growth firms suffer agency cost due to underinvestment problem to transfer wealth from lender to shareholders. Thus, growth opportunities related negatively to long-term debt. The agency cost of high growth firms is mitigated by issuing short-term debt. Small firms have more agency cost. Creditors will restrict the maturity of debt to limit the agency cost in small firms. Therefore, small firms will have more short-term debt (Bevan & Danbolt, 2004). Chittenden et al. (1996) findings show that firms size have significantly different signs of its effect on short-term and long-term debt. Larger firms use more long-term debt, while small firms use more short-term debt.

2. Literature Review

According to the trade-off theory (Kraus & Litzenberger, 1973; Myers, 1984), the way a company achieves an optimal capital structure is by balancing the tax benefits of using debt, reducing agency costs from free cash flow (Benito, 2003) with the costs arising from the risk of bankruptcy. From the perspective of signal theory, capital structure also provides information that signals investors about the good prospects of the company in the future. Debt also acts as a monitoring mechanism in dealing with conflicts between managers and shareholders. Based on the free cash flow hypothesis (M. C. Jensen, 1986), the greater the cash flow available to the company, the greater the use of debt so that managers are committed to paying off debt repayment obligations. Thus, the use of debt is intended to avoid the use of cash flow for expenses that can harm shareholders.

However, the pecking order theory (Myers, 1977) argues that companies choose sources of funds in the opposite order (adverse selection) from the trade-off theory. The company will use internal funds as the first choice in the hierarchy of sources of funds. Debt will be used as a second alternative if internal funding sources are insufficient, and equity as the last funding source option. The pecking order theory is based on the difference in information between the company's internal parties and the market. In general, small companies and companies experiencing high growth are often considered as companies that use a financing sequence pattern based on the pecking order theory (Frank & Goyal, 2003). According to the pecking order theory, the problem of information asymmetry between companies and investors is not too large in large companies. This is because large companies are obliged to submit information periodically and monitored by analysts and securities rating companies (González & González, 2012).

The subsequent section explores the key determinants of capital structure and examines their alignment with established capital structure theories.

Profitability. Theories on the relationship between profitability and capital structure predicts different directions. Based on the pecking order theory, companies will prioritize internal funds as a source of funding. Companies that have high profitability will have more internal funding sources and reduce the use of external funding. The use of debt will be lower in companies that have higher profits (Ross et al., 2012). Thus, the relationship between the level of debt use and profitability is predicted to be negative. Meanwhile, the trade-off theory states that companies will balance the tax benefits received from the use of debt with the potential bankruptcy costs that arise from the use of debt. The use of debt provides benefits to the company because interest expense is a burden that can be used to reduce taxation. Thus, the use of debt will reduce the tax burden for the company. The use of debt will increase the value of the company up to an optimal debt ratio limit where the tax benefits from the use of debt are equal to the potential bankruptcy costs (Brigham et al., 2014). According to the trade-off theory, companies with high profitability will have low risk of bankruptcy and have better incentives to obtain debt and take advantage of debt tax shields. Empirical evidence on the effect of profitability on capital structure shows differences in significance and signs. Profitability was found to have a negative and significant effect on capital structure in Song (2005), Titman & Wessels (1988), Rajan & Zingales (1995), Huang & Song (2006), J. Chan et al. (2017), Acaravci, (2015), Matias & Salsa (2016), Booth et al. (2001), Li & Singal (2019), and Custódio & Metzger (2014). Conversely, a positive and significant effect of profitability on capital structure was found in Matemilola et al. (2018) and Lee & Kuo (2014).

Tangibility. The relationship between tangible assets and debt is based on the problem of conflict between debt owners and shareholders in the agency cost theory model explained in Jensen & Meckling (1976) (1976). They stated that agency costs arise when a company issues debt and changes its investment to a riskier investment project after debt issuance. The selection of riskier investments made by the company is intended to transfer wealth from creditors to shareholders by utilizing the characteristics of options contained in the shares. Therefore, creditors will protect themselves from the risk of transferring wealth by requiring tangible assets as collateral (Song, 2005). Tangible assets such as buildings, machinery and equipment are easier to value by outside parties than intangible assets. The existence of tangible assets reduces the cost of financial distress. The lower the cost of financial distress and agency problems associated with debt, the availability of tangible assets will increase the use of debt (Frank & Goyal, 2009). Harris & Raviv (1990) developed a static capital structure model based on the idea that debt can be used by investors to provide discipline to company management and provide useful information to decide on liquidation or continue the company's current operations. Managers are assumed not to want to liquidate the company and do not want to provide information to investors that results in liquidation decisions. Thus, investors use debt to generate information and monitor management. Asset tangibility was found to have a positive and significant influence on capital structure, in

Huang & Song (2006), Chan et al. (2017), Song (2005), Jong et al. (2008), Rajan & Zingales (1995), Faccio & Xu ((2015), Frank & Goyal (2003), Harris & Roark (2019) and Barclay et al (2006). However, asset tangibility was found to have a negative and significant effect on capital structure in Acaravci (2015), Matias & Salsa (2016), and Booth et al (2001).

Intangible assets. Lim et al. (2020) argue that identifiable intangible asset has substantial support for debt and has the ability to generate future cash flow. A brand name as intangible asset would allow firm to have higher profit margin. Their empirical analysis shows that intangible asset significantly has positive influence to book and market leverage. Furthermore, Dudney et al.(2024) found positive and significant relationship of intangible asset on debt in Asian countries. Similar empirical result also found in Taiwan firms that intangible asset have positive and significant impact to leverage (Peng et al., 2021) and in Japan (Cortez, 2025). Signaling theory states that firms with larger intangible asset has higher asymmetry information as measured by research and development ratio (Dittmar et al., 2003). Disclosure of financial choice information gives incentives to managers. The intensity of signal is subject to asymmetry information magnitude, thus firms with high intangible assets will increase the use of debt. Hence, signaling theory predicts positive sign of intangible asset on debt. On the contrary, agency cost theory would suggest firms with high intangible asset which is risky investment use less debt to reduce risk (Alves & Martins, 2009).

Non-Debt Tax Shields. DeAngelo & Masulis W (1980) hypothesize that any decrease in tax shield related to investment such as depreciation or investment tax credits will increase the use of debt. As proposed in their model, Bradley et al. (1984) suggest an inverse relationship of non-debt tax shields to debt ratio. Downs (1993) states that non debt tax shields will reduce the expected value of tax shields from debt and reduce the benefit of using debt. It is called crowding-out effect meaning that debt is crowded out by non-debt tax shields. It suggests a negative non debt tax shields substitute the benefit of debt tax shields. Thus, non-debt tax shields is expected to have a negative effect on debt. The negative effect of non-debt tax shields on debt also aligns with trade off theory (Cortez, 2025). Empirical findings have shown mix results. Non debt tax shields has negative and significant effect on total debt in Huang & Song (2006), Chan et al., (2017) and Ahmed Sheikh & Wang (2011). However, insignificant effect found in Titman & Wessels (1988), Matias & Salsa (2016), Song (2005), Ozkan (2001).

Size. In accordance to trade off theory, larger firms will have less of financial distress cost. Therefore, larger firms will have more debt because it has the ability to minimize the cost of bankruptcy. Ang et al. (1982) provide empirical evidence supporting the hypothesis of the existence of an economic scale effect on bankruptcy administration costs, where the amount of bankruptcy administration costs has a concave function on the company's liquidation value. It

shows that large companies tend to be less vulnerable to bankruptcy. Thus, bankruptcy costs have a small impact on debt financing decisions for large companies (Bhat et al., 2020). The positive relationship between company size and debt according to Rajan & Zingales (1995) can be caused by the ability of large companies to diversify, thereby reducing the chances of being in financial distress. The prediction that large companies have more debt in their capital structure is based on the fact that large companies are usually more diversified, have a better reputation in the debt market, and face lower information costs when borrowing, so large companies (Frank & Goyal, 2003). Thus, the sign of firm size is expected to be positive if the behavior of firms in using debt follow the trade of theory. Empirical evidence in Shenoy & Koch (1996), Qu et al. (2018), Booth et al. (2001), and Barclay et al. (2006) shows that company size has a positive effect on debt which supports the debt capacity hypothesis.

Uniqueness. Firm's liquidation caused by bankruptcy is related to their capital structure. Workers and suppliers of firms producing unique products will suffer high cost in the event of liquidation because of the high investment in specific skills. Thus, uniqueness is expected to have a negative effect on the use of debt. Uniqueness has several measurements including ratio of research and development expense on sales, selling expenses to sales, dan quit rates (Titman & Wessels, 1988).

Growth opportunities. Agency cost is more severe in growing industry firms. Issuing short term debt rather than long term debt could mitigate agency problem in growing firms (Titman & Wessels, 1988). Under pecking order theory, high growth firms have more asymmetric information problem. Therefore, high growth firms will prefer debt over equity. Pecking order theory suggest a positive sign of growth opportunities on debt. Meanwhile, trade off theory suggest that high growth firms use less debt because growth increase cost of financial distress. Thus, trade off theory predicts negative sign of growth on debt. Market timing theory also suggests negative sign because high growth firms prefer equity financing to gain the benefit on the timing of high market valuation. While agency cost theory also predicts negative signs of growth opportunities on debt with difference explanation. Firms facing lack of investment opportunity will be forced to take more debt to control the managerial discretion (Huang & Song, 2006). Previous studies use market to book value as growth opportunities measure (Booth et al., 2001; Frank & Goyal, 2009; Kayhan & Titman, 2007; Lim et al., 2014).

3. Research Method

We use secondary data gathered from firm's financial report. Sample data are panel data consists of 13 manufacture firms in food processing sector listed in Indonesia Stock Exchange during 2015-2024. Capital structure is the dependent variable in this study. We use three measures of leverage that consist of short-term debt to total equity, long-term debt to total equity, and total debt to total

equity. We include only debt that has interest-bearing. Independent variables are the determinants of capital structure which include profitability, tangibility, intangible asset, non-debt tax shields, firm size, uniqueness, and growth opportunities. Profitability is measured by return on asset. We use earning before interest and tax divided by total assets. Tangibility is measured by the ratio of fixed asset plus inventories to total assets. Intangible asset is calculated by the sum of intangible asset and goodwill divided by total assets. Non-debt tax shields is measured by the ratio of depreciation expense to by total assets. Firm size is measured by natural logarithm of sales. Uniqueness is measured by ratio of selling expense to sales. Growth opportunity is measured by market to book value ratio.

We use panel regression of three estimation model as follows:

$$STD_{it} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 TANG_{i,t} + \beta_3 INTA_{i,t} + \beta_4 NDTS_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 UNQ_{i,t} + \beta_7 MBV_{i,t} + d_t + e_{it} + \mu_{i,t}$$

$$LTD_{it} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 TANG_{i,t} + \beta_3 INTA_{i,t} + \beta_4 NDTS_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 UNQ_{i,t} + \beta_7 MBV_{i,t} + d_t + e_{it} + \mu_{i,t}$$

$$TD_{it} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 TANG_{i,t} + \beta_3 INTA_{i,t} + \beta_4 NDTS_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 UNQ_{i,t} + \beta_7 MBV_{i,t} + d_t + e_{it} + \mu_{i,t}$$

We check the Chow test, Hausmann test, and Lagrange Multiplier test to select the appropriate estimation panel regression model.

4. Finding and Discussion

Descriptive statistics are reported in Table 1. On average, firms have total debt to equity ratio of 70,16%, short-term debt to equity ratio of 37,29% and long-term debt to equity ratio of 32,79%. Total debt to equity ratio has the highest standard deviation of 137,76%. Short-term debt to equity ratio and long-term debt to equity ratio has lower standard deviation than total debt to equity ratio. On average, all types of debt have relatively lower portion than equity in capital structures. Firms have average return on asset of 10,35%. Ratio of tangible asset have average value of 51,44%. The average of intangible asset ratio is 5,63%. Non-debt tax shield has the average of 2,63%. Firm size has the average value of 15,56. Uniqueness has the average value of 9,37%. Average of market to book ratio is 2,12.

Table 1: Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	S.D.
STD	37.97	21.12	713.13	-128.90	83.52
LTD	32.79	15.78	487.05	-122.11	61.30
TD	70.16	49.70	1200.18	-151.49	137.76
ROA	10.35	10.31	115.76	-257.31	28.21
TANG	51.44	49.99	91.46	16.96	16.31
INTA	5.63	0	53.93	0	11.22
NDTS	2.63	2.48	6.49	0.18	1.31
SIZE	15.56	15.19	18.57	10.71	1.44
UNQ	9.37	6.74	37.37	0.88	8.39
MBV	2.12	1.68	6.86	-0.44	1.60

Table 2 reports the regression results of determinants of capital structure. The capital structure is measured by short term debt, long term debt, and total debt ratio. We run chow test and hausmann test to obtain the appropriate estimation model. The test result assigns fixed effect model for the three regression models. Adjusted squares shows that determinant variables can explain 59,3% of capital structure for short term debt model, 80,66% for long term debt model, and 76,91% for total debt model.

Table 2. Panel Regression Result Over Short-term and Long-term Debt

Independent Variables	Short term Debt to Equity	Long Term Debt to Equity	Total Debt to Equity
Adjusted R ²	0.5930	0.8066	0.7691
Prob F-stat	0.0000	0.0000	0.0000
Panel regression model	Fixed Effect	Fixed Effect	Fixed Effect
ROA	0.1799 (1.6652)	-0.1844 (-1.8899)	0.0247 (0.1578)
TANG	1.3329* (3.7151)	0.5016* (2.5371)	1.6898* (3.5150)
INTANG	0.4566 (1.3258)	1.7359* (5.8237)	2.2194* (4.1036)
NDTS	-9.3662*	-8.3543*	-17.944*

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Independent Variables	Short term Debt to Equity	Long Term Debt to Equity	Total Debt to Equity
	(-24014)	(-3.6546)	(-3.3565)
SIZE	0.2810*	0.0148	0.2678*
	(3.5028)	(0.2874)	(2.4558)
UNQ	1.6440	-2.4910*	-0.8507
	(1.6244)	(-3.880)	(-0.6386)
MBV	0.0582	0.1044*	0.1350*
	(1.6427)	(4.4431)	(2.6948)
C	-4.7543*	-0.0134	-4.1972*
	(-3.3862)	(0.9878)	(-2.2132)

Profitability do not have any significant effect on capital structure in all estimation models. The insignificant effect of profitability suggest that debt financing is not the primary source of fund. Internal source of fund is sufficient to fulfill investment needs. Thus, the result supports the pecking order theory.

Tangibility has significant and positive effect over three regression models. It implies that collateral asset considered to be important for accessing both short-term debts, long-term debt, and total debt. The positive signs support the trade off theory that it serves as collateral to debt financing. Larger tangible asset reduces the risk of financial distress cost. Thus, firms with larger tangibility have the ability to use more debt. The positive effect of tangibility on capital structure also supports the agency cost theory. The agency cost in the form of wealth transfer from bondholder to shareholder by issuing debt is mitigated by increasing tangible asset as collateral. Tangible asset serves to protect creditors from the risk of wealth transfer of risky investment. The result of positive effect of tangible asset on capital structure also implies that debt is used as a monitoring tools of management discretion.

Intangible asset has positive and significant effect on long-term debt dan total debt. The result supports findings in Lim et al. (2020) that intangible asset have positive and significant effect on long-term debt and leverage. It implies that intangible asset could support tangible asset in debt financing. The positive sign of intangible assets effect on debt supports the signaling theory. It infers that firms with high intangible asset tend to use more debt due to high asymmetry information.

Non debt tax shield has negative sign over three regression models. It implies that firms have benefited tax shield from depreciation expense. Since firms enjoy tax savings from depreciation,

thus firms reduce the use of debt. It applies both for short term debt and long-term debt. The significant effect of non-debt tax shield supports the crowding out effect on debt financing. The negative significance of non-debt tax shields aligns with the trade of theory that firm reduces debt as it receives tax savings from depreciation expense.

Firm size has positive and significant effect only on short-term debt regression model. The result show that larger firm use more short-term debt. It implies that large firms have less asymmetry information. Thus, it has the capacity to access short-term debt.

Uniqueness is found to be a significant determinant on long-term debt. The signs is expected as theory predicts. Firms producing specific products have higher cost and investment in specialized asset. The higher cost of uniqueness increases the cost of financial distress in liquidation. Thus, firms with uniqueness will use less debt to reduce liquidation cost. It supports the trade-off theory that firm reduce debt to lessen financial distress risk.

Growth opportunities have positive significant effect on long term debt and total debt regression models. The result supports the pecking order theory. In the presence of asymmetry information, firms with high investment opportunities prefer debt over equity to avoid the risk of equity mispricing. It applies when firms are accessing for long-term debt and total debt.

5. Conclusion

Short-term debt has the smallest significant determinants than long-term debt and total debt. Decision in using short-term debt is influenced by tangibility, non-debt tax shields, and firm size. Long-term debt has more significant determinants than short-term debt. There are five determinants that have significant influence on long-term debt, including tangibility, intangible asset, non-debt tax shields, uniqueness, and growth opportunity. Total debt has similar significant determinants with long-term debt except for uniqueness. Instead of uniqueness, firm size has significant effect on total debt model. Non-debt tax shields have the biggest coefficient in all three models which means it is the major determinants of debt. It implies that the crowding-out effect is pronounced in all type of debt. The significant determinants of tangibility and non-debt tax shields in all three regressions debt model confirms the capital structure decision in food processing firms follows the agency cost theory and trade off theory. Under the trade off theory, tangible asset required as collateral in accessing debt financing and vital to lower financial distress cost. Tangible asset also serves as risk mitigation to reduce agency cost.

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