Abstract—This paper intends to analyze the influence of capital structure determinants, such as firm size, growth rate, asset tangibility, and profitability, to capital structure choice of Indonesian public-listed plantation firms using regression model. The findings suggest that firm size and profitability have a statistically significant relationship with leverage, while growth rate and asset tangibility, unlike most researches, do not significantly affect leverage. Align with pecking order theory, firm size and profitability indicates a negative relationship with leverage. Positive relationship is found between growth rate and leverage, which supports signaling theory. Different with previous findings, asset tangibility show a negative relationship with leverage. The result may help corporate decision makers in plantation sector to determine their capital structure choice, which will support firms to maximize shareholder wealth and firm’s value while also minimizing cost of capital.

Keywords—Capital Structure, Determinants, Indonesia, Plantation

I. INTRODUCTION

Capital structure is one of the most significant financial decisions in corporate financing. Capital structure determines the proportion of debt and equity used to fund firm’s activity. Determining firm’s debt ratio is an important financial decision since the right mix of debt and equity enables firms to maximize firm value which will also increase shareholder wealth, and enable firms to finance their activity more efficiently. There are many researches and theories about capital structure, but it is hard to implement the general findings into different sector, since every sector has their own industrial specific characteristics that might influence their financing preference. This paper contributes to capital structure research by focusing in Indonesian plantation firms.

There is variety of plantation products in Indonesia, such as dry rubber, palm oil, palm kernel, cocoa, coffee, tea, leather quinine, sugar cane, tobacco. Palm has the largest plantation area with highest productivity. Plantation, as part of agriculture, plays a strategic role in developing Indonesia’s structural economy. Indonesian agricultural sector grew for 3% in 2011, and contribute for 0.4% of 6.5% Gross Domestic Product (GDP) growth in 2011 [2]. Compared to other sector, agricultural sector, with plantation subsector in it, was among the lowest contributor to GDP growth in Indonesia. A relatively low growth in agricultural sector in Indonesia is due to several factors, such as low scale farming land, lack of technological expertise for increasing efficiency, limited capital, highly dependent on weather, government regulation on agriculture, and relatively hard to get credit. In Indonesia, companies that focus on agriculture, including plantation, were also growing at a lower rate than other sector. One of the problems that may inhibit growth in this sector is how those companies do their operational activity, including how they fund their activity.

Plantation sector is mainly characterized by their asset, with major proportion in plantation area, equipments, mature plantations, and immature plantations. Unlike other industries, with these asset characteristics, plantation firms may have different consideration in determining their capital structure choice. Therefore, a specific research in plantation sector needs to be done in order to understand how plantation firms structure their capital, and enables firms to make a better financing decision.

There are ten stocks listed in Indonesian Stock Exchange (IDX) in plantation sector [6]. This research would analyze data in seven years period, from 2005-2011. Public listed companies are chosen because of the data availability, especially for the financial statement from each company. This paper intends to examine each of those companies’ choice of capital structure and use those data to analyze the main characteristics of Indonesian companies in agricultural sector’s preference for funding their operations. Furthermore, this paper would analyze factors that influence capital structure in plantation sectors. Based on literature reviews, author will analyze four factors that may influence capital structure decisions: firm size, growth rate, asset tangibility, and profitability.

Based on the problem identification, this paper intends to answer these questions:

1. What is the current capital structure preference in Indonesian firms in plantation sector listed in Indonesian Stock Exchange?
2. What is the most significant determinant that influences capital structure decisions in plantation firms in Indonesia?

The findings from this research may lead to a better understanding of Indonesian plantation firm’s financial
condition and preference, help firm’s decision makers to determine their capital structure choice, and in general may improve the plantation development in Indonesia.

II. LITERATURE REVIEW

There are various findings from capital structure research. Modigliani and Miller [9], in their landmark paper, assume that capital structure will be relevant if capital market is frictionless, there are symmetric information available, no transaction cost, and no taxes; in which those assumptions are not applicable for the real financial markets. With the existence of corporate taxes, firms can make tax savings in form of interest tax shield, and capital structure is relevant to maximize firm’s value. Firm may benefit from tax advantages of borrowing money. Based on trade-off theory, choosing high leverage level will make firm being exposed to more bankruptcy costs which may outperform the tax benefit from debt. Financial managers of the firm should search for a certain mix of debt and equity to balance the cost and benefit of issuing more debt.

Pecking order theory, put forward by Stewart Myers [10], explains the behavioral patterns of firm’s financing decision. Under this theory, the capital structure is determined by firm’s preference to use internal financing more than external financing due to the high cost of issuing raising external financing. If external financing is being used, they will choose the safest choice first, so firms will use debt over equity. As firm is required to use more external financing, they will begin with a very safe debt, then risky debt, convertible securities, preferred stock, and common stock as the last choice [8].

Based on signaling model, leverage may be used by firms to create signal about firm prospects to outside investors who are poorly informed. Ross [12] argues that firm with high value are able to issue more debt because issuing debt creates dead weight costs. Less valuable companies which issue debt are more likely to fall into bankruptcy than high value companies. Generally, signaling model assumes that higher leverage will be chosen by firms with best earnings and growth prospects [3].

Firm size is calculated as the natural logarithm of net sales [5]. Other than sales as the indicator of firm size, researcher may also use natural logarithm of total asset [3]. Firm size is related to bankruptcy cost, firm with high value decrease the ratio of direct bankruptcy, so the impact of bankruptcy cost may be negligible to firm’s borrowing decisions. Titman and Wessels [13] argued that larger firms are more diversified which may minimize risk of bankruptcy and have easier access to capital market. Transaction costs associated with the issuance of debt may also be decreased. Thus, firms can borrow at lower interest rate. Rajan and Zingales [11] stated that large firms tend to have more stable cash flows and less exposed to financial distress, so firms may have higher leverage level.

Growth rate is calculated by change in total assets. Based on tradeoff theory, growth opportunities have a negative relationship with firm’s leverage. Growth opportunities are in form of intangible assets, so compared with firms holding tangible assets which can be collateralized, firms with growth opportunity tend to borrow less, which will decrease the leverage level. Inversely, based on signaling theory, firm’s growth may lead to increase in firm’s leverage, because firms with high growth prospects will be reflected in capital market, so the share price is increasing and this is recognized by banks which can reduce the cost of debt for the particular firm.

Asset tangibility measures the asset structure, by calculating the ratio of tangible assets to total assets; with the assumption of tangible assets are fixed assets and inventories [3]. With a high proportion of tangible assets, firm can collateralize their assets to lower the bankruptcy costs [13]. To issue long-term debt, asset tangibility is an important determinant assessed by the lender, and also become a criterion in bank credit policy. Therefore, it is hypothesized that firms with high proportion of tangible assets can have a positive relationship with leverage.

Profitability is calculated by the ratio of earnings before interest, tax, and depreciation to total assets [3],[5]. Based on pecking order theory, profitability has a negative relationship with leverage. A profitable firm prefers to use internal financing, and then choose debt than equity from external financing method. Therefore, pecking order theory suggests that a profitable firm retains its earning to be used as internal financing, thus profitable firms are becoming less levered. Tradeoff theory argues profitability has a positive relationship with leverage. A profitable firm could be associated with higher leverage because of a higher potential tax savings from debt and lower exposure to risk of bankruptcy.

III. RESEARCH METHOD

Data are gathered from secondary data, such as firm’s audited annual financial report, and then author will calculate each variable based on firm’s data published in their audited annual financial report. Sample from this research is taken from all Indonesian public listed companies in plantation sector in 2005-2011. There are a total of ten companies in plantation sector, but the sample included in this research is companies that had already made an Initial Public Offering (IPO) in 2005. Therefore, total sample used for this research is 5 companies, which are:

1. AALI – PT Astra Agro Lestari Tbk
2. LSIP – PT London Sumatra Indonesia Tbk
3. SMAR – PT Smart Tbk
4. TBLA – PT Tunas Baru Lampung Tbk
5. UNSP – PT Bakrie Sumatra Plantations Tbk

Based on the theoretical foundations, hypotheses for determining the influence of independent variables to the dependent variable are formulated as below:

1. Firm Size

   $H_0: \beta_1 \leq 0$
   $H_1: \beta_1 > 0$

   The null hypothesis means firm size of Indonesian public-listed plantation companies has no significant impact to debt ratio. The alternative hypothesis means firm size has a significant positive impact to debt ratio.

2. Growth Rate

   $H_0: \beta_2 \leq 0$
   $H_1: \beta_2 > 0$

   The null hypothesis means growth rate of Indonesian
public-listed plantation companies has no significant impact to debt ratio. The alternative hypothesis means growth rate has a significant positive impact to debt ratio.

3. Asset Tangibility
H₀: β₁≤0
H₁: β₁>0
The null hypothesis means asset tangibility of Indonesian public-listed plantation companies has no significant impact to debt ratio. The alternative hypothesis means asset tangibility has a significant positive impact to debt ratio.

4. Profitability
H₀: β₄≥0
H₁: β₄<0
The null hypothesis means profitability of Indonesian public-listed plantation companies has no significant impact to debt ratio. The alternative hypothesis means profitability has a significant negative impact to debt ratio.

5. Overall Hypothesis
H₀: β₁=β₂=β₃=β₄=0
H₁: at least one of β₁, β₂, β₃, β₄ ≠ 0
The null hypothesis means firm size, growth rate, asset tangibility, and profitability simultaneously has no linear relationship with its debt ratio, while the alternative hypothesis means there is a linear relationship between debt ratio and at least one of the independent variables.

Before proceed to hypothesis testing of the regression model, classical linear regression model assumptions are being tested. Ariefianto [1] argues that if the assumptions are being followed, then parameters generated by ordinary least square are Best Linear Unbiased Estimator (BLUE). There are several assumptions used in this research, such as autocorrelation, heteroskedasticity, and multicollinearity test.

To analyze the determinants of capital structure, a multiple linear regression model is chosen as the statistical method, using EViews 6.0 statistical software. Multiple linear regression models the relationship of a dependent variable with two or more independent variables. Three methods are used in testing the hypothesis, such as the coefficient of multiple determination r², the overall F test, and tests of hypothesis using t-test.

IV. DATA ANALYSIS

A. Leverage Profile

![Graph showing debt ratio by year](image)

Fig. 1. Indonesian public-listed plantation firms leverage profile

The figure above shows leverage profile of Indonesian public-listed plantation firms leverage profile in general. The figure shows a declining trend in leverage in the period of 2005-2011. It indicates that Indonesian public-listed plantation firms tend to issue less long-term debt each year. Since firms borrow less, plantation firms use more proportion of equity financing to finance their activity. Declining trend in leverage may be explained by several factors, including determinants of capital structure. Each determinants and their impact will be further elaborated in the next section of this chapter.

B. Regression Result

The linear regression model that will be tested consists of one dependent variable, debt ratio (Y), and four independent variables, such as firm size (X1), growth rate (X2), asset tangibility (X3), and profitability (X4).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.748965</td>
<td>4.494391</td>
<td>0.0001</td>
</tr>
<tr>
<td>X1</td>
<td>-0.077008</td>
<td>-3.676374</td>
<td>0.0009</td>
</tr>
<tr>
<td>X2</td>
<td>0.050492</td>
<td>1.696539</td>
<td>0.1001</td>
</tr>
<tr>
<td>X3</td>
<td>-0.136661</td>
<td>-0.855571</td>
<td>0.3990</td>
</tr>
<tr>
<td>X4</td>
<td>-0.843145</td>
<td>-7.497145</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Based in regression result presented in table above, the regression model for this research is:

Y = 2.7490 - 0.0770*X1 + 0.0505*X2 - 0.1367*X3 - 0.8431*X4

C. Classical Linear Regression Model

Before further continue into hypothesis testing, the regression model above are being tested based on classical linear regression model assumptions.

C.1 Autocorrelation

Autocorrelation indicates the nature of the regression residuals is not free from one observation to another. Autocorrelation may exist in time series or cross section data. The causes of autocorrelation are inertia, specification bias, cobweb phenomena, data engineering, and seasonality factor [1]. There are several methods to detect the existence of autocorrelation. Method used in this research is Breusch-Godfrey Test.

<table>
<thead>
<tr>
<th>Name</th>
<th>Result</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-Statistic</td>
<td>2.854184</td>
<td>0.0745</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>5.927100</td>
<td>0.0516</td>
</tr>
</tbody>
</table>

From the result above, p-value of obs*R-squared is 0.0516, which is slightly higher than the p-value of 0.05 with significance level 5%. Therefore, Breusch-Godfrey Serial Correlation LM Test result shows that there is no autocorrelation exists in the error term of the model.

C.2 Heteroskedasticity

Heteroskedasticity is a situation of unequal spread or variance, so the variance is not constant [4]. A situation when residual of variance is constant although one or more independent variables are changing indicates a homoskedastic condition. Based on Ariefianto [1], there are
several causes of heteroskedasticity, such as error learning situation, discretionary ability, data collection technique, existence of outliers, and specification problem. Method used to test heteroskedasticity in this research is Breusch-Pagan-Godfrey test.

### TABLE III: BREUSCH-PAGAN-GODFREY TEST FOR HETEROSEDASTICITY

<table>
<thead>
<tr>
<th>Name</th>
<th>Result</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-Statistic</td>
<td>0.800853</td>
<td>0.5342</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>3.376746</td>
<td>0.4969</td>
</tr>
</tbody>
</table>

X̄² statistical value, shown in obs*R-squared value is 3.3767, which is less than X̄² value in statistical table (0.05; 30), 43.773. P-value corresponding with obs*R-squares is 0.4969, which is greater than significance level 0.05. Therefore, the regression model shows no heteroskedasticity problem, regression model has a homoskedastic error term.

#### C.3 Multicollinearity

Gujarati [4] explains that multicollinearity indicates the existence of a perfect or less than perfect linear relationship between some or all explanatory variables of a regression model. To test the existence of multicollinearity in the regression model, VIF (Variance Inflation Factor) is used. If VIF value is greater than 10, it indicates multicollinearity. VIF is calculated by 1/(1-R²), with R² stated in the regression model result using EViews 6.0. R² for the regression model with four independent variables is 0.744393, so VIF value is 3.9122, lower than 10, so variables used in the regression model does not indicate multicollinearity.

#### D. Hypothesis Testing

Classical linear regression model assumptions tested in the previous part ensures that regression model satisfy the basic assumption, which are no autocorrelation, multicollinearity does not occur, and heteroskedasticity does not exist.

#### D.1 Coefficient of multiple determination \( r^2 \)

\( r^2 \) value obtained in the regression model is quite high, 74.44% of debt ratio in plantation sector is explained by four independent variables used in the regression model, while 25.56% is explained by other variables not included in the regression model.

#### D.2 Test of hypothesis using t-test

With degree of freedom of 30 and significance level 5%, the decision rule is accept H0 if t-value from the statistical result above is between -1.6973 and 1.6973.

For firm size (X1), the t-value is -3.6764, not in the range of acceptable t-value. Therefore, null hypothesis is rejected. The alternative hypothesis means firm size of Indonesian public-listed plantation companies has a significant impact to debt ratio, but unlike the hypothesis, firm size from the regression model has a negative relationship to debt ratio. Firm size is calculated as natural logarithm of total asset, increase in total asset will lead to decrease in debt level in the capital structure preference of Indonesian public listed plantation firms. The negative relationship between firm size and leverage in Indonesian public listed plantation firms supports pecking order theory. High firm size means firm has huge amount of assets. In plantation sector, crops production level has a high correlation with plantation area, which is also part of asset. To lenders, high firm size shows that the particular plantation firm is in a healthy condition, and assets may be collateralized which may decrease creditor’s risk. Furthermore, larger firm tends to be more diversified and thus have a lower bankruptcy risk. To investors, high firm size for plantation firms is a good signal, because it usually is followed by increase in productivity. Therefore, firm could use equity financing from investors and lower the issue of long-term debt as firm size increases.

\( T \)-value for growth rate (X2) is 1.6965, and still in the range of acceptable t-value. Therefore, the decision is accepting null hypothesis. Growth rate of Indonesian public-listed plantation companies has no significant impact to debt ratio. Although not significant, growth rate has a positive relationship with debt ratio, and this is consistent with the theory. Trade-off theory assumes that growth rate has a negative relationship with debt ratio, because growth opportunities are in form of intangible assets which may not be collateralized. This view is not being supported by this research. Conversely, increase in Indonesian public-listed plantation firms growth rate leads to increase in debt ratio, which may be related to signaling model. Plantation firms rely on the plantation productivity, and growth rate is determined by calculating net change in total assets. So, a high growth rate means plantation firms may have higher asset, which leads to increase in productivity. High growth rate increase the expectation of better future performances, and banks are willing to give a higher valuations to the particular firms because it lowers bank’s credit risk. Therefore, firms with high growth rate may issue more long-term debt to finance their activity and future growth opportunities.

For asset tangibility (X3), the t-value is -0.8555, which is still in the range of acceptable t-value. Therefore, null hypothesis is accepted. Asset tangibility of Indonesian public-listed plantation companies has no significant impact to debt ratio. Although not significant, unlike the hypothesis, asset tangibility from the regression model has a negative relationship to debt ratio. Many researches on capital structure confirm that asset tangibility has a positive relationship with firm’s leverage, because tangible assets may be collateralized for debt. Higher asset tangibility means lower creditor risk of lending money, thus cost of borrowing money can be decreased which leads to increase in leverage. Asset tangibility in this research covers fixed assets and inventory, including immature and mature plantations, and although not significant to leverage, more tangible assets in Indonesian public-listed plantation firms leads to lower debt ratio. This may be explained by the nature of plantation firms, the main products and tangible assets are their crops, but crops itself is not a long-term assets that may be used as collateral. Therefore, more tangible assets, although not significant, may lead to lower debt ratio.

\( T \)-value for profitability (X4) is -7.4971, not in the range of acceptable t-value. Therefore, the decision is rejecting null hypothesis and accepting alternative hypothesis. Profitability of Indonesian public-listed plantation companies has a significant impact to debt ratio. Consistent with the
hypothesis and theory, profitability has a negative relationship with debt ratio. The result does not support trade-off theory, which argues that profitability has a positive relationship with leverage, because firm may have higher potential tax savings and lower bankruptcy cost. Negative significant relationship with leverage is consistent with hypothesis, previous researches, and support pecking order theory. Indonesian public-listed plantation firms tend to retain their profit to fund company activity. More profit constitutes to lower leverage, because firms use internal financing to lower the cost of borrowing money. Profitable firms have a lower need to external financing, so they structure their capital with lower leverage.

\[ D.3 \text{ The overall F-test} \]

F-value from the statistical test is 21.84, which is greater than F-value from table (3; 30), 2.92. Therefore, the decision is rejecting null hypothesis and accepting alternative hypothesis. F-test shows that four independent variables simultaneously have a significant relationship with debt ratio. It means there is a linear relationship between debt ratio and at least one of the independent variables [7].

V. CONCLUSION

This paper has analyzed the determinants of capital structure in Indonesian public-listed plantation firms in 2005-2011, by using multiple linear regression model and sample of five companies. From the data analysis, it may be inferred that leverage level of Indonesian public-listed plantation firms are decreasing each year. This indicates that firms issue less long-term debt for their financing activity. The descriptive statistics also shows a relatively low level of debt compared to firm’s asset.

In the next section, this paper further analyzes the factors that influence capital structure choice in Indonesian public-listed plantation firms. Regression model with five independent variables did not pass the classical linear regression model assumptions, so plantation area variable was removed. From the four independent variables tested in this regression model, only two are statistically significant. Firm size and profitability has a significant negative relationship with debt ratio, which are consistent with pecking-order theory. Asset tangibility and growth rate are not statistically significant to debt ratio. Unlike previous researches, although insignificant, asset tangibility shows a negative relationship with leverage, which may happen because most of plantation firm’s assets has less collateralize value. Growth rate has a positive relationship with leverage which is consistent with signaling theory.

It may be concluded that Indonesian public-listed plantation firm’s capital structure is mainly determined by firm size and profitability level. The information from this research can increase understanding of capital structure choice in Indonesian plantation firms. Furthermore, it may be used by corporate decision makers to make a better capital structure decision, thus will help firms to maximize value of the firm, increase shareholder’s wealth, and lowering cost of capital.

REFERENCES


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