JOURNAL OF
BUSINESS AND MANAGEMENT
Vol. 1, No. 1, 2012: 59-65

OPTIMAL CAPITAL STRUCTURE OF PT. S2P FOR PROJECT EXTENSION CILACAP CFSPP UNIT 3 EXTENSION (1x600 MW) 2307 kcal/kwh at The YEAR of 2012

Yasmin Trianti Pratiwi, Sudarso Kaderi Wiryono and Subiakto Soekarno
School of Business and Management
Institut Teknologi Bandung, Indonesia
[1] *yasmin.trianti@sbm-itb.ac.id,* [2] *sudarso_kw@sbm-itb.ac.id,* [3] *subiakto@sbm-itb.ac.id*

Abstract

In order to meet the electricity demand in Indonesia and rapid growth of the Company, PT.Sumber Segara Primadaya, a private company, wants to decide the best financing alternative for the Cilacap CFSPP Unit 3 Project Extension (1x600MW) at the super critical point of 2307 kcal/kWh at the year of 2012. Based on the feasibility study, the company requires some amount of fund, which can be acquired from the debt or the equity. However, the debt and equity proportion is very important for the return, because it is related to the cost of the financing; Weighted Average Cost of Capital (WACC). With the WACC method, the Company can determine the best financing alternative based on the lowest WACC. Furthermore, the result of the WACC approach will be compared with the financial projection of the Company when the project will start. Instead of using one method, the Company will also use the EPS (Earnings Per Share) approach as the comparing method. EPS method is a way to determined the best financing decision for the Company with considering the greatest Earnings Per Share in every debt-equity proportion level. The optimal financing alternative for this project is 50,60% of debt and 49,40% of equity. At this proportion level, the value of the Company also reach the highest point, USD 497.408.734. Based on the EPS method, the optimum debt level is 0% with the equity of 100%. The different result from both method can be occured because the EPS does not considering the cost of each financing decision. Overall, the WACC method are more preferred than the EPS method because EPS don't calculate the financing cost of both equity and debt. The lowest financing cost will give the highest yield.

Keywords : optimum capital structure, strategic financing decisions, WACC, earnings per share

Introduction

Electricity can be categorized as the primary and basic human needs. Along with the growing population, people need more electricity supply in order to balancing the demand and running the life. In indonesia, there are PT.Perusahaan Listrik Negara (PT.PLN Persero) as the monopolistic company owned by the Government of Republic Indonesia which has the responsibility to fulfill the people needs of electricity. However, PT.PLN Persero does not produce the electricity by themselves, but also purchasing the electricity from the private companies; one of them are PT.Sumber Segara Primadaya.

Thus, in order to fulfill the electricity demand in south Java island area, PT. Sumber Segara Primadaya (PT.S2P), as the Independent Power Producer, is deciding to make a project extension called Cilacap CFSPP Unit 3 (1x600 MW) as the additional energy supplier to PT.PLN Persero instead the existing 2 Units (2x300 MW). The existing unit is Coal Based Power Plant (PLTU) Cilacap in Middle Java. This project extension will start at the year of 2012 and hopefully it will be finished by the end of the year of 2015.

However, all firms need operating capital to support their sales. To acquire that operating capital, funds must be raised, usually as a combination of equity and debt. PT.S2P is currently considering various financing decisions faced by the Company. Thus, the appropriate strategy for financing the source of fund is important, in order to maximize the firm's value and achieve the investment target.
In addition to these action, the Management of the Company believes that the Company is required to make strategic financing decisions. This capital structure decision is part of the strategic financing decisions, including a firm's choice of a target capital structure, the average maturity of its debt, and the specific sources of financing it chooses at any particular time.

In this calculations scheme, the Company will use the supercritical point as the minimum scale of production that the Power Plant will produce, which is 2,307 kcal/kWh. Based on that problem, this research will try to examine the way to maximize the firm's value with also consider the existing economic, monetary, regulatory, political, and market conditions in order the Company have the sufficient cash to meet its debt obligations. Also, this research will find the best debt and the equity proportion for financing this project.
This research calculated the optimal capital structure to reach the target to financing the project extension that will start at 2012. The financing fund will be allocated for the Cilacap CFSPP UNIT 3 (1x600 MW) extension, by using the asumption of 2,307 kcal/kWh without the component e (transmisssion) build by the PT.S2P.

Theoretical Foundation

Capital Structure Decisions

According to Brigham and Ehrhardt (2005), *"A company can obtain long-term financing in the form of equity, debt, or some combination"*. The firm's ratio of debt and equity is called its capital structure. Although actual levels of debt and equity may vary somewhat over time, most firms try to keep their financing mix close to a target capital structure. The capital structure decisions include a firm's choice of a target capital structure, the average maturity of its debt, and the specific sources of financing it chooses at any particular time.

Earnings Per Share Approach

Based on Gitman (2006), the first thing to do to apply the Earnings Per Share (EPS) Approach to calculate the Optimum Capital Structure is by determining the probability of EBIT (Earnings before Interest and Tax) in order to calculate the Expected EPS , Standard Deviation of EPS, and Coefficient of Variation o EPS in every capital structure debt ratio. After that, the Author will plot the data into the graph.
Ross, Westerfield, and Jordan also made a statement that the impact of leverage is evident when the effect of the restructuring on EPS and ROE (Return on Equity) is examined.
In particular, the variability in both EPS and ROE is much larger under the proposed capital structure

Weighted Average Cost of Capital Approach

This is a measurement of every cost of financing that the Company will use debt and equity. Since PT.S2P is a private means which will not take the common stock as the funding option, the calculation of r_s will use the CAPM (Capital Asset Pricing Model) method, according to Gitman (2006) :

$$r_s = R_F + [b \times (r_m - R_F)]$$

where r_s is cost of equity, R_F is risk-free rate of return, $(r_m - R_F)$ is market risk premium, r_m is market return; return on the market portfolio of assets, and *b* is beta.
Moreover, to find the beta coefficient, since the Company is a private company and have no market price historical data, this research will use the benchmarking with the similar industry (Brigham and Ehrhardt, 2005).
Noted by Brigham and Ehrhardt (2005), beta is the only variable that can be influenced by management in the CAPM cost of equity equation. It can be affected by (1) firm's operating decisions which affected b_u (unlevered beta) (2) by its capital structure decisions as reflected in its Debt/Equity ratio.

$$\beta = \beta\upsilon [1 + (1- T)(D/E)]$$

Based on the Brigham and Ehrhardt (2005), as a starting point, the Company can take its current beta (from the benchmarking with the similar industry), tax rate, and Debt/Equity ratio and calculate its unlevered beta, b_u, by transforming the equation of :

$$\beta\upsilon = \beta / [1 + (1- T)(D/E)]$$

After determined the b_u, the Hamada Equation can be used to estimate how changes in the

Debt/Equity ratio would affect the leveraged beta, b, and the cost of equity r_s.

$$\beta_l = \beta\upsilon [1 + (1- T)(D/E)]$$

All the equations above are on the condition where βυ (Unlevered Beta), β (Beta), T (Tax Rate), β_l (Current Beta).

Cost of Debt

According to Damodaran (2006), The cost of debt is the rate at which the Company can borrow at currently, It will reflect not only the Company default risk but also the level of interest rates in the market.

Since not all the Company listed and have ratings, Damodaran (2006) gives two alternatives to calculate the Cost of Debt:

a) If the company's borrowed money from the financial institution, the estimation of cost of debt default spread that usually charged will came up.
b) Estimate a synthetic rating and default spread. Synthetic rating means act as rating agency and assign a rating to a firm based on its financial ratio. A simpler version is using interest coverage ratio. Thus, the table below 2.1 shows the range of interest coverage ratios for small manufacturing firms in each S&P rating class.

Table 1. Interest Coverage Ratios and Ratings

Interest Coverage Ratio	Rating	Typical Default Spread
(> 12.50)	AAA	0.35%
(9.5 – 12.5)	AA	0.50%
(7.5 – 9.5)	A+	0.70%
(6 – 7.5)	A	0.85%
(4.5 – 6)	A–	1.00%
(4 – 4.5)	BBB	1.50%
(3.5 – 4)	BB+	2.00%
(3 – 3.5)	BB	2.50%
(2.5 – 3)	B+	3.25%
(2 – 2.5)	B	4.00%
(1.5 – 2)	B–	6.00%
(1.25 – 1.5)	CCC	8.00%
(0.8 – 1.25)	CC	10.00%
(0.5 – 0.8)	C	12.00%
(< 0.5)	D	20.00%

Source : Damodaran, 2006

Next, after estimate the synthetic rating, then the Author needs to calculate the interest rate on debt. The Damodaran estimation for market interest rate should be adjusted with the Indonesian market interest rate. Thus, the table 2.2 below shows the market interest rate that already adjusted for Indonesian Market.

Table 2. Indonesian Market Interest Rate

Rating	Indonesian Market Interest Rate
AAA	12.2%
AA	12.72%
A+	13.24%
A	13.76%
A–	14.28%
BBB	14.80%
BB+	15.32%
BB	15.84%
B+	16.36%
B	16.88%
B–	17.40%
CCC	17.92%
CC	18.44%
C	18.96%
D	19.48%

Source : Hary, 2007

Optimal Capital Structure

After finished to calculate the cost of debt and the cost of equity, the Weighted Average Cost of Capital (WACC) can be calculated. It is the weighted average of the cost of equity and the aftertax cost of debt.

However, it has to be noticed that the aftertax interest rate is simply equal to the pretax rate multiplied by 1 minus the tax rate. Thus;

$$WACC = (E/V) \times r_s + (D/V) \times r_d \times (1-T_c)$$

Where T_c is corporate tax rate, r_d is cost of debt. Gittman (2006) believed that the value of the firm is maximized when the cost of capital is minimized. The value of the firm can be defined by using a modification of the simple zero-growth valuation model below;

$$V = EBIT \times (1-T) / WACC$$
$$= NOPAT / WACC$$

Where EBIT is Earnings Before Interest and Taxes, T isTax Rate, NOPAT is Net Operating Profit After Taxes (EBIT – (1-T)), WACC is Weighted Average Cost of Capital.

Assumed that NOPAT (and therefore EBIT) is constant, the value of the firm, V, is maximized by minimizing the Weighted Average Cost of Capital (WACC).

According to the Stenchbacka and Tombak (2002) in their journal about the Investment, Capital Structure, and Complementaries between Debt and Equity, when restricted to debt as the only instrument for the external finance, debt-financed investment is an increasing and concave function of the firm's net-worthwith a positive intercept. Thus, this statement will be used as one of the reference for this research.

Data Analysis

The risk premium for PT.S2P is 9% based on the Country Risk Premium from Damodaran (January 2010). Tax rate that being used is 28% based on the company's tax rate regulation in Indonesia. The risk free rate is the current rate (1st semester 2010) of Bank Indonesia which is 6.5%.

Cost of Equity

In regard to the power of business system in Indonesia which there are no public listed company, the Author do a benchmarking with the other country who has the same Country Risk rate with Indonesia; India to find the beta. The Author do the benchmarking to a Company in India, Mcnally Bharat Engineering Company, considering the same Net Profit Margin (4.2%) with the PT.S2P. The beta that being used in this research is 1,99 which will be the beta to calculate the unlevered beta for the Company. The table below shows the Debt Ratio which described the each level of the debt proportion and the Cost of Equity in every point.

Table 3. PT. S2P Cost of Equity

Debt Ratio	D/E Ratio	Unlevered Beta	Levered Beta	Cost of Equity
0.00%	0.00%	0.26	0.26	8.84%
0.30%	0.30%	0.26	0.26	8.85%
0.80%	0.81%	0.26	0.26	8.85%
1.00%	1.01%	0.26	0.26	8.86%
1.30%	1.32%	0.26	0.26	8.86%
1.80%	1.83%	0.26	0.26	8.87%
3.10%	3.20%	0.26	0.27	8.89%
4.20%	4.38%	0.26	0.27	8.91%
5.50%	5.82%	0.26	0.27	8.94%
7.20%	7.76%	0.26	0.27	8.97%
8.70%	9.53%	0.26	0.28	9.00%
10.20%	11.36%	0.26	0.28	9.03%
13.10%	15.07%	0.26	0.29	9.09%
17.30%	20.92%	0.26	0.30	9.19%
22.30%	28.70%	0.26	0.31	9.32%
27.50%	37.93%	0.26	0.33	9.48%
32.90%	49.03%	0.26	0.35	9.67%
38.80%	63.40%	0.26	0.38	9.91%
43.70%	77.62%	0.26	0.41	10.15%
50.60%	102.43%	0.26	0.45	10.57%
55.00%	122.22%	0.26	0.49	10.90%
63.00%	170.27%	0.26	0.58	11.71%
67.00%	203.03%	0.26	0.64	12.26%
71.00%	244.83%	0.26	0.72	12.96%
76.90%	332.90%	0.26	0.88	14.45%
80.00%	400.00%	0.26	1.01	15.58%
85.00%	566.67%	0.26	1.32	18.39%
90.00%	900.00%	0.26	1.94	24.00%
100%	-	0.26	-	-

1.1. Cost of Debt

In order to calculate the cost of debt, the each level of debt interest rate is urgently needed to know. After that, it has to be adjusted into the after tax interest rate which usually called as after tax cost of debt. Bond rating can be the determining tools for interest rate on different level of debt.

Maximum Tax Benefits = EBIT x Tax Rate
= $ 36,233,000 x 28%
= $ 10,145,240

Adjusted Marginal Tax Rate = Maximum Tax Benefit Interest Expense

Thus, after the tax-cost debt can be found by multiplying the interest rate on debt with its adjusted tax rate. Based on the calculation, the Cost of Debt after Tax will increase along with the debt ratio, from 8,78% at the debt ratio of 0% untill the 17,56% at the debt ratio of 100%.

Weighted Average Cost of Capital and the Comparison with the Financial Condition.

In order to calculate the optimum capital structure to fund this project extension on 2012, the Weighted Average Cost of Capital (WACC) needs to be calculated along with the each level of debt and the equity proportion. That will be described at the table below.

Table 4. WACC and Company's Value

Debt Ratio	Cost of Debt	Equity Ratio	Cost of Equity	WACC	Company's Value
0.00%	8.78%	100.00%	15.50%	15.50%	348,145,548
0.30%	8.78%	99.70%	15.47%	15.45%	349,372,761
0.80%	8.78%	99.20%	15.43%	15.36%	351,429,216
1.00%	8.78%	99.00%	15.41%	15.32%	352,255,695
1.30%	8.78%	98.70%	15.38%	15.27%	353,499,602
1.80%	8.78%	98.20%	15.34%	15.18%	355,583,984
3.10%	8.78%	96.90%	15.22%	14.95%	361,069,317
4.20%	8.78%	95.80%	15.12%	14.75%	365,785,764
5.50%	9.16%	94.50%	15.01%	14.54%	372,070,585
7.20%	9.53%	92.80%	14.85%	14.28%	377,972,813
8.70%	9.91%	91.30%	14.72%	14.06%	383,878,221
10.20%	10.28%	89.80%	14.58%	13.85%	389,629,342
13.10%	11.03%	86.90%	14.32%	13.49%	400,157,317
17.30%	11.78%	82.70%	13.94%	13.00%	415,157,990
22.30%	12.53%	77.70%	13.49%	12.50%	431,853,989
27.50%	12.53%	72.50%	13.03%	11.92%	452,566,739
32.90%	13.28%	67.10%	12.54%	11.56%	466,857,567
38.80%	13.49%	61.20%	12.01%	11.12%	485,412,212
43.70%	14.04%	56.30%	11.57%	10.93%	493,677,062
50.60%	14.64%	49.40%	10.95%	10.74%	502,353,812
55.00%	15.47%	45.00%	10.55%	10.78%	500,580,334
63.00%	15.91%	37.00%	9.83%	10.85%	497,171,427
67.00%	16.09%	33.00%	9.47%	10.89%	495,616,710
71.00%	16.25%	29.00%	9.11%	10.95%	492,772,307
76.90%	16.46%	23.10%	8.58%	11.10%	486,320,936

80.00%	16.56%	20.00%	8.30%	11.20%	481,915,359
85.00%	17.22%	15.00%	7.85%	11.72%	460,595,745
90.00%	17.35%	10.00	7.40%	11.98%	450,453,840
100%	17.56%	0.00%	-	12.64%	426,846,107

Based on the calculation above, the WACC functions of this project is same with the theory of the Cost Functions and Value of the Capital costs and the optimal capital structure of the Lawrence J.Gittman theory in "Principles of Managerial Finance", which describe the functions as the U shaped.

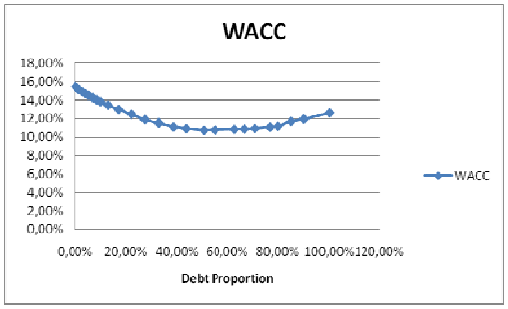

Figure 1. PT.S2P WACC Plotting

If we take a look at the WACC plot above, for the term of the maximum debt and the equity proportion for this Project, surely the lowest WACC theoretically decide the best debt and equity proportion which the Debt is 50,60%, and the Equity will be 49,40%. Theoritically, the optimal capital structure to finance this project based on the WACC approach is at this Debt 50,60% point. Also, at that point, the value fo the firm is the highest, which is reach the USD 497.408.734.

However, in reality, at the end of 2011, there is a condition where the Company will have the total Equity of USD 31.044.000 as mentioned on the Balance Sheet of the Financial Projection. Thus, the total Equity needs to fund the 49,40% from the total project (USD 528.000.000) is USD 260.832.000. It is quite far from the total project amount. Moreover, if we count the Value of the Company based on the NOPAT (Net Operating Profit After Tax) divided by the WACC (Weighted Average Cost of Capital) and plotted it to the graph of the capital costs and the optimal capital structure, result is shown in **Error! Reference source not found..**

Earning Per Share Approach

There is a 25% chance that sales will total $ 178.837.000, a 50% chance that sales will total $179.373.000, and 25% chance that sales will total $179.837.000. The table above calculate and resulting the EBIT on every chances.

Thus, the calculation of the number of shares of common stock outstanding under each alternative of debt and equity proportion is needed. Because this is a private company, there willbe no shares ofcommon stock outstanding, so the number of shares will remain constant at the number of shares of 892,859.

Furthermore, the calculation of the annual interest for each debt ratio is needed. The annual interest increases as well with the increasing of financial leverage (debt ratios).

The next step is to use the levels of EBIT and associated probabilities developed of (25%, 50%, and 25%), the number of shares of common stock, and the annual interest values calculated in the table above, which is 9% to calculate the earnings per share (EPS) of each debt ratios from the 0% to the maximum debt, which is 90% and 100%. The tax assumption is 30%. There are also the expected EPA, the standard deviation of EPS, and the coefficient of variation of EPS associated with each debt ratio. Because the coefficient of variation measures the risk relative to te expected EPS, it is the preferred risk measure for use in comparing the capital structures. As the firm's financial leverage increases, so does its coefficient of variation of EPS. As expected, an increasing level of risk is associated with increased levels of financial leverage.

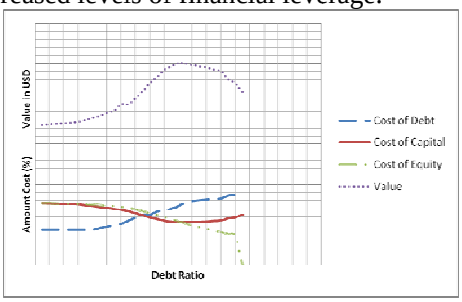

Figure 2. PT. S2P Cost Functions and Value

Table 5. Sales and Associated EBIT Calculation for PT.S2P

Sales and Associated EBIT Calculations			
Profitability of Sales	0.25	0.5	0.25
Sales of Revenue	178,837	179,373	179,837
Less : Total Operational Cost	73,287	73,287	73,287
Less : Depreciation	31,137	31,137	31,137
EBIT	74,413	74,949	75,413

Moreover, We can plot the expected EPS and coefficient of variation relative to the debt ratio. Plotting the data above will have the result on the two graphs below. The graph shows that as debt is substituted to the equity (as the debt ratio increases), the level of EPS rises, untill the last point, which is 100%. After that, the expected EPS will be zero.

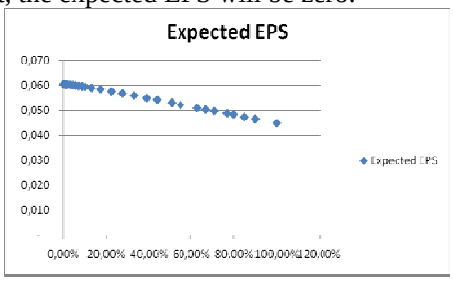

Figure 3. PT. S2P Expected EPS Plotting

The next plotting graph below is shows us about the risk behavior as measured by the coefficient of variation. It can be seen that risk increases with financial leverage. A portion of the risk can be attributed to the business risk, but mostly it will change the financial risk (liquidity risk, credit risk, etc).

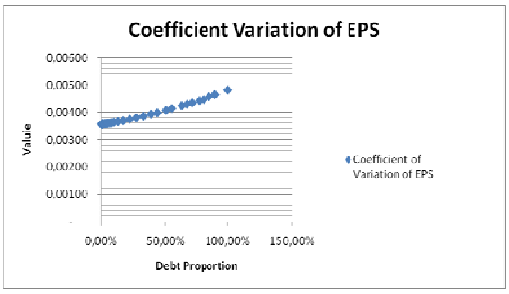

Figure 4. Coefficient of Variation of EPS

Conclusion

There are several conclusions from this research such as:

a) According to the Weighted Average Cost of Capital (WACC) approach, in order to financing the Project Extension of Cilacap CFSPP Unit 3 (1x600 MW) at the 2,307 kcal/kWh at the year of 2012, the optimum capital structure for PT.S2P is 50,60% of debt and 49,40% of equity. This debt-equity proportion level will also maximize the Company's value to the USD 502,353,812.

b) From the Earnings Per Share (EPS) method, the optimum capital structure which can maximize the Earnings Per Share of the Company's shareholders is on 0% of debt and the 100% of equity with the amount of the expected Earnings Per Share of USD 60,44. However, actually all of those situation cannot be realized according to the Company's financial projection which mentioned that the Company's equity available at the end of year 2011, USD 31.044.000.

Based on the both of the calculation method, PT.S2P should increase their equity available in order to meet the optimum capital structure from the WACC calculation for funding this project extension before the starting time, 2012. The other way to financing this future project is by making a long-term debt than the existing debt although the Company has to pay more for the Cost of Debt. For that reason, PT.S2P has to stabilize and make a good track record for a company in order to attract the other financing institution to give the Company lower interest rate. The last option will be to stick with the expected equity available at the end of year 2011 with the debt level of 94,12%.

Further Research

In the future, if there will be further research for this topic, it will be great if there is a further calculation about the other source of financing (long-term debt) options and its calculation for the Cost of Debt from it. The calculation will be use in order to estimate the rate of the Cost of Debt that the Company actually pay if the Company choose to make a long-term debt for fulfilled their equity available when a project will be started. Thus, the result also can be used for find the WACC for the overall condition (not just for the current project) of the Company.

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