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Impact of Pension Plan Risk on Cost of Debt and Equity in Companies with Pension Plan Assets

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Abstract—This study analyzes the effect of pension plan risk on cost of debt and equity in companies with pension plan assets based on the value of pension liabilities, the difference between value of pension assets and liabilities, and the difference between risk of pension assets and liabilities. 177 observations consisting of Non-financial companies listed on Bursa Efek Indonesia from 2012 to 2014 were included in the study. From the study, it was shown that there is no significant effect of pension plan risk on cost of debt and equity based on all the three measurements. Investors and creditors in the Indonesian capital market had low information on pension plan risk, therefore they do not account for such risks when making investment decisions.

Keywords—Pension plan risk, cost of debt, cost of equity

I. INTRODUCTION

Indonesian companies find that the law of the Republic of Indonesia, Number 13 (2003), Articles 156 and 167, stipulating minimum pension payments to retirees is a major liability. Information disclosure on the value of pension liabilities is regulated by the Statement of Financial Accounting Standard 24 *Employee Benefits*. To mitigate the impact of payment default risk, some companies contribute to a pension fund. Pension fund is managed by companies that aim to manage the pension assets (consisting of accrued contributions by companies plus or minus investment gains or losses) to ensure that the liabilities will be honored. However, the risk of default does not totally disappear. In majority of companies investing in a pension plan, risk still arises from a deficit condition (i.e., the value of pension liabilities is higher than that of pension assets) and from the probability of incurring losses when pension assets are invested in high-risk investment portfolio, such as stock. This enlarges pension deficit and leads to increase in the mandatory contribution to be made by a company [1].

Companies contributing to pension plan were likely to engage in earnings management on the invested pension assets by allocating these investments in a return-maximizing order and establishing a high rate of return on these investments to maintain higher value of earnings to appease investors [2, 3, 4]. Companies with pension deficits have lower stock prices, because of the practice of earnings management, which aims at minimizing pension liabilities in those companies [5, 6]. Such practice will have a bearing on management's market reputation. Companies with pension deficits often display meager financial performance [7]. Therefore, it is difficult to attract, leading to decline in companies' stock prices.

Capital market efficiently captures pension-related information although the pension liabilities account did not feature on the balance sheet during their research period [8]. Pension-deficit companies had lower stock returns because of the negative impact of pension deficit on company's earnings and cash flow [9]. Pension liabilities negatively impact not only on return on investment, but also on debt rating, which is determined based on the likelihood that a company would fail to honor payment obligation [4, 8, 10].

This study refers to the previous study about the impact of pension plan risk on equity risk (measured by a company's whole systematic risk, equity systematic risk, and the stock return variability) and debt risk (measured by debt rating) [4]. Pension plan risk is measured by three measurements. The first measure is guided by study which suggested that bond market prices reflect a company's pension liabilities and are highly sensitive to the value of pension liabilities [11]. Second, pension plan risk is measured by the difference between the values of pension assets and liabilities, finding of a negative impact of pension deficit on earnings and cash flow arising from increasing required contribution [9]. Third, pension is measured by the difference between the risk of pension assets and that of pension liabilities, finding that the risks of pension assets and liabilities were part of company's entire risk profile, hence making this information vital for investors in investment decision making [8]. Pension plan risk based on the first and third measurements had a positive impact on company's whole systematic risk, equity systematic risk, and stock return variability and a negative impact on debt rating [4]. By contrast, pension plan risk based on the second measurement negatively affected a company's whole systematic risk, equity systematic risk, and stock return variability, whereas positively affected debt rating. These findings imply that pension plan risk factor is vital for investors in making investment decisions.

This study focuses on the impact of pension plan risk on the cost of debt and equity using all independent and control variables considered to understand Indonesian capital market's response to pension plan risk in determining interest rate and expected return [4]. The present study differs in terms of the dependent variables. Adopt debt and equity risk as dependent variables [4], whereas the present study uses cost of debt and equity as dependent variables because both the variables have been theoretically proven to be vital for investors in investment decision making.

II. THEORETICAL REVIEW

A. Agency Theory

Ross et al. [12] claim one of the agency problems arise when both investors and management choose high-risk projects in anticipation of high returns. This leads to high risk of payment default for creditors. In terms of pension plan risk, agency problem arises when the management tends to invest maximum pension assets in to high-risk instruments, such as stock, in anticipation of a high return while simultaneously increasing the likelihood of investment loss. This leads to increasing deficit gap and, in turn, to increasing contribution required to fill the deficit gap.

B. Cost of Debt and Cost of Equity

a) Cost of Debt

Binsbergen, Graham & Young [13] state that the cost of debt including financial distress, personal tax, debt overhang, agency problems, and other benefits and expenses affect the choice of optimal debt. Ross et al. [12] clarify that for an obligation of low-default risk, calculating the yield to maturity is an effective method to estimate a creditor's expected return and borrowing cost. Yield information is easily available when trading is done through banks or investment management companies. However, there is paucity of yield information in Indonesian bond market owing to limited volume of bond trading in comparison with that in Indonesian stock market. The present study uses an alternative method to measure cost of debt [14, 15]. The cost of debt is measured by the interest expenses divided by the average of interest-bearing debt at the beginning and end of a year.

b) Cost of Equity

Ross et al. [12] claim that cost of equity is expected or required return on equity by investor. It is frequently measured by capital asset pricing model (CAPM), introduced by Markowitz [16]. He explained that investors try to maximize the investment return in a portfolio even if they are aware of the risk of portfolio. However, as the present study investigates pension plan risk related to a company's financial performance regarding pension funding, a relevant alternative method that considers the earnings factor in measuring cost of equity is used [14, 15]. The cost of equity is measured by subtracting earning-to-price ratio from the median of the same industry's earning-to-price ratio, which is calculated by subtracting the company's earning-to-price ratio. Price reflects investor's willingness to pay each unit of earnings, which is in contrast to the cost of equity that a company should pay [14].

C. Risk and Cost

a) Impact of Debt Risk on Cost of Debt

Ross et al. [12] claim that one factor leading to the increase in the risk of debt payment failure arises from a risky investment decision made by management and investor. With regard to pension plan risk, the allocation of pension assets investment portfolio that has maximum high-risk investment, such as stock, will increase risk of investment loss. This loss will decrease the value of pension assets, increase the pension deficit, and finally increase the contribution required. Higher contribution payment that is treated as usual expense leads to decrease of earnings and cash flow. In addition, accrued amortization of actuarial loss reflected on income statements also decrease earnings [9]. Decline in cash flow and earnings resulting from such payment and accrual increase the probability of default in debt payment. By contrast, pension liabilities are treated as general liabilities, in that both demand full claims [8, 10]. The higher the value, the higher the probability of payment default to retirees. The increase of default risk will increase the cost of debt [17].

These studies show that increasing pension liabilities and decreasing earnings and cash flow availability will both lead to creditors needing higher-interest expense to compensate for the increasing probability of default. Table I shows that the average proportion of net pension liabilities to total liabilites is 6,86%—a number which is probable to affect company's overall solvability.

b) Impact of Equity Risk on Cost of Equity

Companies with poor financial performance in the previous period were negatively associated with the downside risk, that is, risk that the real return falls below the expected return, during the next period [18]. In other words, the poorer the company's performance, the higher is risk that the actual return falls below the expected return in the next period. This is based on the prospect theory developed by Kahneman & Tversky (1969) [18], which describes that the feature of risk taking develops from an individual to an organizational level. A company with poor financial performance tends to take high-risk decision in expectation of high return, though it may in fact result in low value. This will increase the probability that a company performs poorly again in the following period.

With regard to pension plan risk, companies with pension deficit adopted earnings management practice, which aims at minimizing pension liabilities in such companies, such as investing pension funds into high-risk investment and increasing the discount rate [5, 3, 6]. Besides, a company with higher pension deficit reflects its cash flow and earnings limitation to pay proper contribution [7]. Consequently, such a company should contribute to more as per the regulation by government law to minimize the deficit. In effect, this will slightly decrease company's earnings. Both reasons—limited financial performance and earnings management practice—lower market pricing on companies' stock. With regard to the calculated of cost of equity as proposed [14] dividing earning-per-share to stock price, a slight decrease on earnings as numerator and higher decrease on stock price as denominator will increase cost of equity. Therefore, pension plan risk is predicted to have a positive influence on cost of equity.

TABLE I. AVERAGE PROPORTION OF NET PENSION LIABILITIES TO TOTAL LIABILITIES IN SAMPLE COMPANIES

Year	Average in 2012	Average in 2013	Average in 2014	Average in 3 years (2012-2014
Proportion	7,05%	7,10%	6,41%	6,86%

As mentioned earlier, the present study focuses on the impact of pension plan risk based on three measurements on cost of debt and cost of equity in Indonesian capital market. There is lack of studies in Indonesia providing such information. Therefore, the present study attempts to understand Indonesian capital market's response to pension plan risk.

III. HYPOTHESIS DEVELOPMENT

A. Impact of Pension plan risk on Cost of Debt

Pension liabilities are fundamentally the same as general liabilities, in that both demand full claims [8, 10]. However, the U.S. and U.K bond markets have captured information efficiency on pension plan risk and have higher spread sensitivity over pension liabilities than over general liabilities [11]. This sensitivity is clearer in companies with lower debt ratings. Pension plan risk based on the value of pension liabilities has a negative impact on debt rating, which is associated with the likelihood of default [4, 11]. Therefore, the higher value of pension liabilities implies the higher probability of default. This will lead to increasing cost of debt [17]. The following hypothesis is developed:

H1a: Pension plan risk based on value of pension liabilities has a positive impact on the cost of debt.

A company with higher profitability had higher funding level and debt rating [2]. This result is in agreement with that found in studies [4, 10]. By contrast, companies with a lower debt rating and those in pension deficit condition needed additional external financing to fulfill the necessary contribution payment and to continue to finance valuable projects [7]. Without additional external financing, such companies do not have enough resources to fulfill both and the risk that they cannot pay pension to all retirees would be higher. The increasing risk of default leads to increasing cost of debt [17]. Therefore, lower deficit (the higher surplus) will lead to decreasing cost of debt. Therefore, the following hypothesis is developed:

H1b: Pension plan risk based on the difference between the value of pension assets and the value of pension liabilities has a negative impact on the cost of debt.

Maximum allocation of pension assets in high-risk investment, such as stock, endangered the company's position as a whole and eventually will put creditors at risk [1]. This is one of the agency problems as stated by Ross et al. [12]. This is consistent with the studies [1, 4] which found that the higher the pension plan risk measured by the difference between the risk of pension assets and that of pension liabilities, the lower the debt rating, which also means a higher probability of default. This leads to increasing cost of debt [17]. Therefore, the higher the difference in risk, the lower the debt rating, and the higher probability of default, which leads to increasing cost of debt. The following hypothesis is developed:

H1c: Pension plan risk based on the difference between the risk of pension assets and that of pension liabilities has a positive impact on the cost of debt.

B. Impact of Pension plan risk on Cost of Equity

Market pricing and expectation from a company depends on company's ability to generate earnings and cash flow [9]. Higher value of pension liabilities means a higher contribution to make to minimize the deficit. It also means higher risk of earnings management practice, which can possibly result in investment loss. Increasing contribution and amortization of actuarial loss in pension liabilities decrease of earnings and cash flow. The decrease, however, is not as high as the decrease in stock price of that company, which reflects the company's overall limited performance condition and decreasing management's reputation due to earnings management practice. A slight decline in earnings divided by higher decrease on stock price will result in higher cost of equity. Therefore, the higher value of pension liabilities of a company, the higher cost of equity it should pay. Therefore, the following hypothesis is developed:

H2a: Pension plan risk based on the value of pension liabilities has a positive impact on cost of equity.

In case of pension deficit, when the value of pension liabilities is higher than the value of pension deficit, the contrasting condition (i.e., the value of pension assets is higher than value of pension liabilities) will lead to pension surplus. Pension surplus condition will benefit stockholders because of minimum contribution payment, so there is increased availability of cash and earnings. Therefore, the company's stock will be priced higher. Stock price is the reflection of the investor's willingness to pay, the contrast of the cost of equity a company should pay [14]. Therefore, the higher the stock price, the lower the cost of equity. The following hypothesis is developed:

H2b: Pension plan risk based on the difference between the value of pension assets and the value of pension liabilities has a negative impact on the cost of equity.

In practice, the risk of pension liabilities is relatively the same as the risk of general liabilities [7]. However, the risk of pension assets, especially if put in high-risk investment such as stock, will be much higher than the risk of general assets. Neglecting that risk will bias the overall firm risk. However, the maximum investment of pension assets in high-risk investment put creditors at risk [1]. The high risk of investment loss will increase the pension deficit, and as a result, will increase contribution payment required. It has a negative impact on earnings and cash flow. However, as explained before, markets put lower pricing on companies with high pension plan risk. This will greatly decrease stock price than the decrease on earnings. It will increase the cost of equity [14]. The following hypothesis is developed:

H2c: Pension plan risk based on the difference between risk of pension assets and risk of pension liabilities has a positive impact on the cost of equity.

IV. RESEARCH METHODOLOGY

This study adopts a quantitative method with secondary data sources obtained from Indonesia Stock Exchange. Samples are chosen based on several criteria. The study samples include non-financial listed companies with fiscal year end of December, have a fair value of plan assets on notes to financial statements, never have had negative equity during the research period 2012—2014, and have information about stock price since 2011. We use fixed-effect method in panel data because the samples are chosen purposively. According to Judge et al. [19] and Gujarati [20],

fixed-effect method can be used if samples are chosen on certain criteria.

The present study uses all independent and control variables used by [4]. Independent variables are Pension plan risk 1 based on the value of pension liabilities (PR1), Pension plan risk 2 based on the difference between the values of pension assets and liabilities (PR2), and Pension plan risk 3 based on the difference between risks of pension assets and liabilities (PR3), while control variables are firm leverage (FL), firm growth (GR), firm profitability (ROI), firm size (FS), and equity beta (EQBETA). In addition, other control variables such as firm age (AGE) [21]; ability to pay interest expense (INTCOV), standard deviation of latest years' earnings (σNIBE) [14, 15]; standard deviation of the recent years' cash flow from operation (σCFO) [18], and pension fund status (PFSTAT) are included. In the present study, cost of debt (COD) and cost of equity (COE) are used as dependent variables.

Each of the pension plan risks are calculated as follows:

$$PR_1 = \frac{Pension\ Liabilities}{(Debt+Equity)}; \text{ using year beginning data} \quad (1)$$

$$PR_2 = \frac{(Pension\ Assets - Pension\ Liabilities)}{(Debt+Equity)}; \text{ using year beginning data} \quad (2)$$

$$PR_3 = \frac{(\beta PA * Pension\ Assets)}{(Debt+Equity)} - \frac{(\beta PL * Pension\ Liabilities)}{(Debt+Equity)}; \text{ using year beginning data} \quad (3)$$

βPA = systematic risk of pension assets, measured by employing average monthly return of overall Pension Funds year 2012–2014 (data from Yearly Statistics of Pension Fund published by Financial Service Authority) and monthly return of Jakarta Composite Index (computed based on data from www.yahoofinance.com) year 2012—2014 in a market model regression.

βPL = systematic risk of pension liabilities, measured by employing monthly price of 30-year Indonesian Government bond FR0045 year 2012—2014 (computed based on daily data from The Indonesia Capital Market Institute) and monthly price of Jakarta Composite Index year 2012—2014 (data from www.yahoofinance.com) in a market model regression

Calculations of cost of debt and cost of equity follow these formulations:

COD = interest expense/ average interest-bearing debt as of year beginning and year end

COE = (earning-per-share/ stock price) minus median of same industry earning-per-share/stock price; same industry earning-to-price ratio is computed by eliminating company's earning-to-price ratio

Calculations of control variables follow these formulations:

FL : Total leverage/ total assets; using year beginning data

GR : Log of (1 plus change percentage of book value of equity as of year-end and year beginning)

ROI : Net income/total assets; using year beginning data

FS : Log of firm's total assets; using year beginning data

AGE : Log of firm age since going public until year beginning

INTCOV : Operating income/interest expense; using year beginning data

σCFO : Standard deviation of cash flow from operation in last 3 years

σNIBE : Standard deviation of net income in last 3 years

EQBETA : Employing daily return of company's stock and daily return of Jakarta Composite Index in a market model regression; using 2 data, as of year t-1 and year t, then both regression results are added (following Dimson's adjustment in [4])

PFSTAT = pension fund status, 1 if some or all of the pension plan year t is managed by group-or-company-owned pension fund, 0 if all of the pension plan is managed by pension fund that has the status of being the company's partner (nongroup).

Research Model:

Model 1a: The impact of pension plan risk on the cost of debt based on the value of pension liabilities

$$COD_{i,t} = \beta_0 + \beta_1 PR1_{i,t-1} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 INTCOV_{i,t-1} + \beta_8 \sigma CFO_{i,t} + \beta_9 \sigma NIBE_{i,t} + \beta_{10} EQBETA_{i,t} + \beta_{11} PFSTAT_{i,t} + \varepsilon \quad (4)$$

Model 1b: The impact of pension plan risk on the cost of debt based on the difference between the values of pension assets and pension liabilities

$$COD_{i,t} = \beta_0 + \beta_1 PR2_{i,t-1} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 INTCOV_{i,t-1} + \beta_8 \sigma CFO_{i,t} + \beta_9 \sigma NIBE_{i,t} + \beta_{10} EQBETA_{i,t} + \beta_{11} PFSTAT_{i,t} + \varepsilon \quad (5)$$

Model 1c: The impact of pension plan risk on cost of debt based on the difference between risk of pension assets and risk of pension liabilities

$$COD_{i,t} = \beta_0 + \beta_1 PR3_{,t-1} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 INTCOV_{i,t-1} + \beta_8 \sigma CFO_{i,t} + \beta_9 \sigma NIBE_{i,t} + \beta_{10} EQBETA_{i,t} + \beta_{11} PFSTAT_{i,t} + \varepsilon \quad (6)$$

Model 2a: The impact of pension plan risk on the cost of equity based on the value of pension liabilities

$$COE_{i,t} = \beta_0 + \beta_1 PR1_{i,t-1,} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 \sigma CFO_{i,t} + \beta_8 \sigma NIBE_{i,t} + \beta_9 EQBETA_{i,t} + \beta_{10} PFSTAT_{i,t} + \varepsilon \quad (7)$$

Model 2b: The impact of pension plan risk on the cost of equity based on the difference between the values of pension assets and pension liabilities

$$COE_{i,t} = \beta_0 + \beta_1 PR2_{i,t-1,} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 \sigma CFO_{i,t} + \beta_8 \sigma NIBE_{i,t} + \beta_9 EQBETA_{i,t} + \beta_{10} PFSTAT_{i,t} + \varepsilon \quad (8)$$

Model 2c: The impact of pension plan risk on the cost of equity based on the difference between risk of pension assets and risk of pension liabilities

$$COE_{i,t} = \beta_0 + \beta_1 PR3_{i,t-1,} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 \sigma CFO_{i,t} + \beta_8 \sigma NIBE_{i,t} + \beta_9 EQBETA_{i,t} + \beta_{10} PFSTAT_{i,t} + \varepsilon \quad (9)$$

This study uses quantitative method, as well as descriptive statistical analysis, panel data running method testing, classical assumptions testing, correlation coefficient testing, and hypothesis testing.

V. RESULT

Table III shows that PR1 has a minimum value of 0.16% and a maximum value of 24.01%. The variability of PR1 tends to be well distributed among the sample companies, as indicated by the standard deviation of 0.06, which is close to 0. PR2 has a minimum value of -15.64% and a maximum value of 0.47%, with an average of -3.38% and variance of 0.03. This suggests that most of the sample companies are in a condition of pension deficit. PR3 has a minimum value of 0.01%, a maximum 0.5%, and a very low variability close to 0, as shown by the standard deviation of 0.001. This implies that pension plan risk based on the net risk of pension assets tend to be well distributed among samples. However, COD has a minimum value of 0 in companies without interest-bearing debt and a maximum value of 26.63% in companies with a high proportion of interest-bearing debt. On average, COD is 7.89%. COE has a minimum value of -1.2540. The negative sign implies that some companies are making losses. In addition, the maximum value of COE is 0.2663, which shows that earnings-per-share is quite high, or the stock price is quite low. A high standard deviation of 0.37 shows that COE determined by factors of earning-per-share and stock price varies among the sample companies.

TABLE II. SAMPLE SELECTION RESULT

Criteria	Number of Firms
Non-financial listed companies which have fiscal year end of December	401
Firms have fair value of plan assets on notes to financial statements	65
Firms never had negative equity during research period 2012—2014	63
Firms have stock price information since 2011	61
Number of samples	59
Research period (2012—2014)	3 (three) years
Number of observations	177

A. Descriptive Statistic

TABLE III. DESCRIPTIVE STATISTIC

Variable	Minimum	Maximum	Average	Standard Deviation
PR1	0.0016	0.2401	0.0652	0.0566
PR2	−0.1564	0.0047	-0.0338	0.0337
PR3	0.0001	0.0050	0.0013	0.0011
COD	0.0000	0.2663	0.0789	0.0500
COE	−1.2540	1.8356	0.0829	0.3704
FL	0.0436	0.8500	0.4565	0.1875
GR	−0.2512	0.4762	0.0393	0.0769
ROI	−0.1740	0.4614	0.0985	0.1006
FS (in Millions of Rp)	223.874	213.994.000	16.357.012	30.038.597
AGE	0.0833	33.0000	15.1299	8.8854
INTCOV	−644.5482	905.2179	101.685371	235.1858188
σCFO	0.0037	0.1497	0.0446	0.0314
σNIBE	0.0010	0.1495	0.0285	0.0300
EQBETA	−0.4092	4.4868	1.4835	0.9973
PFSTAT	0,0000	1,0000	0,68000	0,4660

B. Classical Assumption Testing

TABLE IV. TEST RESULT OF MULTICOLLINEARITY

Dependent Variable	Independent and Control Variables	VIF value		
		Using PR1	*Using PR2*	*Using PR3*
COD	PR	1,344	1,266	1,363
	FL	1,389	1,392	1,384
	GR	1,061	1,064	1,059
	ROI	1,668	1,591	1,713
	FS	1,599	1,634	1,590
	AGE	1,148	1,153	1,143
	INTCOV	1,514	1,568	1,500
	σCFO	1,294	1,305	1,293
	σNIBE	1,170	1,164	1,170
	EQBETA	1,480	1,504	1,476
	PFSTAT	1,187	1,142	1,203

Dependent Variable	Independent and Control Variables	VIF value		
		Using PR1	*Using PR2*	*Using PR3*
COE	PR	1,325	1,204	1,355
	FL	1,327	1,342	1,317
	GR	1,058	1,062	1,056
	ROI	1,499	1,398	1,536
	FS	1,589	1,631	1,578
	AGE	1,119	1,116	1,116
	σCFO	1,294	1,303	1,293
	σNIBE	1,166	1,160	1,166
	EQBETA	1,451	1,465	1,448
	PFSTAT	1,187	1,142	1,203

TABLE V. HETEROSKEDASTICITY TEST RESULT

	COD			COE		
	PR1	***PR2***	***PR3***	***PR1***	***PR2***	***PR3***
Variable	*Sig.*	*Sig.*	*Sig.*	*Sig.*	*Sig.*	*Sig.*
FL	,990	,935	,979	,767	,778	,817
GR	,562	,480	,582	,786	,703	,820
ROI	,017	,004	,023	,955	,749	,971
FS	,025	,033	,023	,014	,009	,013
AGE	,058	,049	,061	,003	,002	,003
INTCOV	,342	,280	,397	-	-	-
σCFO	,075	,065	,085	,479	,751	,381
σNIBE	,004	,007	,004	,705	,694	,682
EQBETA	,142	,171	,127	,006	,012	,006
PFSTAT	,260	,152	,267	,143	,174	,146
PR1	,165			,325		
PR2		,311			,265	
PR3			0,193			,399

TABLE VI. CORRELATION COEFFICIENT TESTING

		PR1	*PR2*	*PR3*	*FL*	*GR*	*ROI*	*FS*	*AGE*	*INTCOV*	*σCFO*	*σNIBE*	*EQBETA*	*PFSTAT*	*COD*	*COE*
Pearson Correlation	*PR1*	1	-,819**	,986**	-,245**	-,011	,376**	-,222**	-,051	,308**	,166*	-,004	-,081	,233**	,052	,021
	PR2	-,819**	1	-,713**	,256**	,041	-,198**	,271**	,068	-,317**	-,177*	-,022	,041	-,051	-,035	,046
	PR3	,986**	-,713**	1	-,226**	,002	,403**	-,202**	-,045	,281**	,147	-,011	-,092	,272**	,056	,040
	FL	-,245**	,256**	-,226**	1	-,017	-,319**	,244**	-,255**	-,380**	-,149*	-,241**	,032	,033	,117	-,183*
	GR	-,011	,041	,002	-,017	1	,085	-,066	-,065	-,023	-,068	-,071	,076	-,063	,112	,126
	ROI	,376**	-,198**	,403**	-,319**	,085	1	-,171*	,155*	,460**	,380**	,174*	-,024	,198**	,048	,136
	FS	-,222**	,271**	-,202**	,244**	-,066	-,171*	1	-,013	-,268**	-,238**	-,112	,496**	,058	-,165*	-,241**
	AGE	-,051	,068	-,045	-,255**	-,065	,155*	-,013	1	,234**	,084	,084	,011	,047	-,100	,199**
	INTCOV	,308**	-,317**	,281**	-,380**	-,023	,460**	-,268**	,234**	1	,191*	,089	-,197**	,117	,297**	-
	σCFO	,166*	-,177*	,147	-,149*	-,068	,380**	-,238**	,084	,191*	1	,275**	-,118	,016	-,040	,053
	σNIBE	-,004	-,022	-,011	-,241**	-,071	,174*	-,112	,084	,089	,275**	1	-,101	-,064	-,008	,035
	EQBETA	-,081	,041	-,092	,032	,076	-,024	,496**	,011	-,197**	-,118	-,101	1	-,0156*	,137	-,231**
	PFSTAT	,233**	-,051	,272**	,033	-,063	,198**	,058	,047	,117	,016	-,064	-,156*	1	-,004	,135
	COD	,052	-,035	,056	,117	,112	,048	-,165*	-,100	-,297**	-,040	-,008	,137	-,004	1	-
	COE	,021	,046	,040	-,183*	,126	,136	-,241**	,199**	,270**	,053	,035	-,231**	,135	-	1
		PR1	*PR2*	*PR3*	*FL*	*GR*	*ROI*	*FS*	*AGE*	*INTCOV*	*σCFO*	*σNIBE*	*EQBETA*	*PFSTAT*	*COD*	*COE*
Sig.	*PR1*		,000	,000	,001	,880	,000	,003	,502	,000	,028	,963	,286	,002	,488	,784
	PR2	,000		,000	,001	,584	,008	,000	,368	,000	,019	,767	,590	,503	,641	,542
	PR3	,000	,000		,003	,981	,000	,007	,556	,000	,051	,885	,226	,000	,457	,599
	FL	,001	,001	,003		,823	,000	,001	,001	,000	,048	,001	,676	,659	,121	,015
	GR	,880	,584	,981	,823		,262	,382	,393	,762	,366	,347	,318	,405	,139	,094
	ROI	,000	,008	,000	,000	,262		,023	,040	,000	,000	,021	,752	,008	,524	,071
	FS	,003	,000	,007	,001	,382	,023		,868	,000	,001	,136	,000	,441	,029	,001
	AGE	,502	,368	,556	,001	,393	,040	,868		,002	,268	,264	,884	,538	,184	,008
	INTCOV	,000	,000	,000	,000	,762	,000	,000	,002		,011	,238	,009	,120	,000	-
	σCFO	,028	,019	,051	,048	,366	,000	,001	,268	,011		,000	,118	,837	,600	,483
	σNIBE	,963	,767	,885	,001	,347	,021	,136	,264	,238	,000		,181	,394	,914	,646
	EQBETA	,286	,590	,226	,676	,318	,752	,000	,884	,009	,118	,181		,039	,070	,002
	PFSTAT	,002	,503	,000	,659	,405	,008	,441	,538	,120	,837	,394	,039		,953	,074
	COD	,488	,641	,457	,121	,139	,524	,029	,184	,000	,600	,914	,070	,953		-
	COE	,784	,542	,599	,015	,094	,071	,001	,008	-	,483	,646	,002	0,074	-	

a. *significant alpha 5%, **significant alpha 1%

According to the table, we can see that all VIF values are less than 10, which means that in all regression models, there is no indication of multicollinearity.

C. Heteroskedasticity Test

Table IV shows some significant values that are < 0.05. It implies that heteroskedasticity exists in the regression models tested. As a solution, the white cross-section feature on the tab coefficient covariance method in Eviews 10 was chosen.

D. Correlation Coefficient Testing

Table V shows that without considering the independent and dependent variables position and without using any assumption, PR1, PR2, and PR3 do not have significant correlations with COD and COE. In consequence, variables are found to be significantly correlated with COD is FS and INTCOV, while variables significantly correlated with COE are FL, FS, AGE, and EQBETA. FS is correlated negatively with COD, which indicates that bigger company tends to refrain from adding more debt. INTCOV is correlated negatively with COD, which means that the better the paying ability of a company, the lower the cost of debt demanded by creditors. FL is correlated negatively with COE. The more debt used by a company, the less earnings available to investor due to more interest payment. The decrease on earnings will result in lower COE. FS is correlated negatively with COE. It shows that a bigger company tends to have higher capitalization, so the stock price is relatively high. A higher stock price decreases the COE [22]. AGE is correlated positively with COE, which implies that an older company has greater earnings. It increases COE. EQBETA is correlated negatively with COE, because high return variability tends to occur in a firm with poor financial performance [23]. Such company has lower earnings. Consequently, it will result in lower COE [14].

E. Hypotesis Testing

TABLE VII. REGRESSION RESULT - MODEL 1A

	PR1			
Variable	Expected Sign	Coefficient	t-statistic	Prob.
PR1	+	0.014497	0.108968	0.9134
FL	+	-0.141578	-3.707628	0.0003*
GR	-	0.114930	3.646877	0.0004*
ROI	-	-0.078696	-1.541752	0.1261
FS	-	0.091063	6.732043	0.0000*
AGE	-	0.000965	0.164757	0.8694
INTCOV	-	4.34E-05	3.017553	0.0032*
σCFO	+	-0.162751	-2.118605	0.0364*
σNIBE	+	-0.006078	-0.071547	0.9431
EQBETA	+	0.000794	0.479333	0.6327
PFSTAT	+	0.021336	2.625128	0.0099*
R^2 fixed effect, white cross-section				0.821436
Adjusted R^2				0.706287
F-stat				7.133677
p-value				0.000000

$$COD_{i,t} = \beta_0 + \beta_1 PR1_{i,t-1} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 INTCOV_{i,t-1} + \beta_8 \sigma CFO_{i,t} + \beta_9 \sigma NIBE_{i,t} + \beta_{10} EQBETA_{i,t} + \varepsilon$$

TABLE VIII. REGRESSION RESULT - MODEL 1B

	PR2			
Variable	Expected Sign	Coefficient	t-statistic	Prob.
PR2	-	-0.129114	-1.664580	0.0989
FL	+	-0.140450	-4.100990	0.0001*
GR	-	0.112393	4.181199	0.0001*
ROI	-	-0.077202	-1.492090	0.1386
FS	-	0.094045	116.6797	0.0000*
AGE	-	0.001289	0.200185	0.8417
INTCOV	-	4.27E-05	3.196296	0.0018*
σCFO	+	-0.157705	-1.909838	0.0588
σNIBE	+	-0.004354	-0.052777	0.9580
EQBETA	+	0.000871	0.702639	0.4838
PFSTAT	+	0.020781	2.958205	0.0038*
R^2 fixed effect, white cross-section				0.821723
Adjusted R^2				0.706760
F-stat				7.147697
p-value				0.000000

$$COD_{i,t} = \beta_0 + \beta_1 PR2_{i,t-1} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 INTCOV_{i,t-1} + \beta_8 \sigma CFO_{i,t} + \beta_9 \sigma NIBE_{i,t} + \beta_{10} EQBETA_{i,t} + \beta_{11} PFSTAT_{i,t} + \varepsilon$$

TABLE IX. REGRESSION RESULT - MODEL 1C

	PR3			
Variable	Expected Sign	Coefficient	t-statistic	Prob.
PR3	+	-0.130512	-0.017264	0.9863
FL	+	-0.142072	-3.749894	0.0003*
GR	-	0.115558	3.667321	0.0004*
ROI	-	-0.079313	-1.544521	0.1254
FS	-	0.089668	5.566101	0.0000*
AGE	-	0.000935	0.160893	0.8725
INTCOV	-	4.37E-05	2.959297	0.0038*
σCFO	+	-0.163097	-2.129925	0.0355*
σNIBE	+	-0.006191	-0.073064	0.9419
EQBETA	+	0.000734	0.425048	0.6717
PFSTAT	+	0.021805	2.417570	0.0173*
R^2 fixed effect, white cross-section				0.821427
Adjusted R^2				0.706272
F-stat				7.133258
p-value				0.000000

$$COD_{i,t} = \beta_0 + \beta_1 PR3_{,t-1} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 INTCOV_{i,t-1} + \beta_8 \sigma CFO_{i,t} + \beta_9 \sigma NIBE_{i,t} + \beta_{10} EQBETA_{i,t} + \beta_{11} PFSTAT_{i,t} + \varepsilon$$

According to Tables VII, VIII, and IX, adjusted R^2 values are all more than 70%. It means that independent and control variables in the model can strongly explain the dependent variable COD. F-stat *p*-values of 0.00 show that independent and all control variables simultaneously have significant influences on the dependent variable COD. However, PR1, PR2, and PR3 do not have a significant impact on COD. These results may be attributed to the following factors. First, the value of pension liabilities (PR1) is not reported in the statement of financial position. Therefore, it is not significant to creditors. Second, creditors heed more to interest-bearing debts and debts related to external parties when determining risk of payment default. Therefore, although the net value of pension liabilities (PR2) is reported in the statement of financial position, creditors do not focus on that value. Third, the number of companies having a pension plan was relatively lower than the total number of listed non-financial companies. In 2012, the number of listed non-financial companies with pension plan was less than 70 or approximately 15% of the total number of all the listed non-financial companies, which were more than 400. This implies that pension plan risk (PR3) is not considered as an important factor when creditors determine the interest rate.

Control variables that have a significant impact on COD are FL, GR, FS, INTCOV, and PFSTAT. Meanwhile, σCFO has a significant impact on COD based on regression result - model 1A and 1C only. The result based on model 1B does not show any significant impact. FL has negative impact on COD, because FL is calculated based on the overall liabilities, while COD is calculated based on the interest-bearing debt alone. All sample companies have a large portion of non-interest-bearing liabilities. Some companies do not have any interest-bearing debt at all; therefore their COD are 0. GR has a positive impact on COD, which means that the higher growth of a company, the more debt the company uses to run the business. This leads to increasing default risk. Increasing default risk leads to higher COD. FS has a positive impact on COD, which means that a bigger company uses more debt to run the business, which increases default risk and COD. This is consistent with the impact of GR on COD. INTCOV has a positive impact on COD, which means that a company with good paying ability tends to maintain or increase debt level in running business. Higher debt level leads to more COD. σCFO has a negative impact on COD, which means higher volatility of cash flow from operation refrains company from adding more debt. This leads to decreasing default risk and thus COD. Other control variables such as ROI, AGE, σNIBE, and EQBETA are not found out to have a significant impact on COD.

According to Tables X, XI, and XII, Adjusted R^2 values are all more than 80%. It implies that independent and control variables in the model can strongly explain the dependent variable COE. F-stat *p*-values of 0.00 show that independent and all control variables simultaneously have significant influences on the dependent variable COE. PR1, PR2, and PR3 do not have a significant impact on COE, because investors pay more attention to bottom-line earnings and free cash flow available after subtracting operational, investing, and financing expenditures. Factors related to earnings and cash flow, which affect pension plan risk, are contribution payment and amortization of actuarial loss.

TABLE X. REGRESSION RESULT - MODEL 2A

	PR1			
Variable	Expected Sign	Coefficient	t-statistic	Prob.
PR1	+	0.215422	0.397534	0.6918
FL	-	0.259631	1.008140	0.3156
GR	+	0.404115	1.826754	0.0705
ROI	+	-0.546320	-1.429011	0.1559
FS	-	-0.203292	-2.890014	0.0047*
AGE	+	0.003056	0.093880	0.9254
σCFO	-	0.390768	1.095601	0.2757
σNIBE	-	-1.547745	-3.239726	0.0016*
EQBETA	+	0.022461	1.344041	0.1818
PFSTAT	+	0.040453	0.670482	0.5040
R^2 fixed effect, white cross-section				0.881036
Adjusted R^2				0.806133
F-stat				11.76236
p-value				0.000000

$$COE_{i,t} = \beta_0 + \beta_1 PR1_{i,t-1,} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 \sigma CFO_{i,t} + \beta_8 \sigma NIBE_{i,t} + \beta_9 EQBETA_{i,t} + \beta_{10} PFSTAT_{i,t} + \varepsilon$$

TABLE XI. REGRESSION RESULT - MODEL 2B

	PR2			
Variable	Expected Sign	Coefficient	t-statistic	Prob.
PR2	-	-0.215308	-0.214112	0.8309
FL	-	0.256129	1.013310	0.3132
GR	+	0.406885	1.760648	0.0811
ROI	+	-0.547614	-1.440200	0.1527
FS	-	-0.213759	-4.545464	0.0000*
AGE	+	0.003209	0.101941	0.9190
σCFO	-	0.393807	1.141643	0.2561
σNIBE	-	-1.545729	-3.217430	0.0017*
EQBETA	+	0.021913	1.328386	0.1869
PFSTAT	+	0.044579	0.874813	0.3836
R^2 fixed effect, white cross-section				0.881015
Adjusted R^2				0.806098
F-stat				11.75996
p-value				0.000000

$$COE_{i,t} = \beta_0 + \beta_1 PR2_{i,t-1,} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 \sigma CFO_{i,t} + \beta_8 \sigma NIBE_{i,t} + \beta_9 EQBETA_{i,t} + \beta_{10} PFSTAT_{i,t} + \varepsilon$$

TABLE XII. REGRESSION RESULT - MODEL 2C

	PR3			
Variable	Expected Sign	Coefficient	t-statistic	Prob.
PR3	+	10.45560	0.433232	0.6657
FL	-	0.258433	1.014261	0.3127
GR	+	0.405236	1.876613	0.0633
ROI	+	-0.546994	-1.433048	0.1547
FS	-	-0.203236	-2.605094	0.0105*
AGE	+	0.003011	0.090991	0.9277
σCFO	-	0.389946	1.077113	0.2838
σNIBE	-	-1.548500	-3.265620	0.0015*
EQBETA	+	0.022513	1.378298	0.1710
PFSTAT	+	0.040002	0.657375	0.5123
R^2 fixed effect, white cross-section				0.881035
Adjusted R^2				0.806131
F-stat				11.76219
p-value				0.000000

$$COE_{i,t} = \beta_0 + \beta_1 PR3_{i,t-1,} + \beta_2 FL_{i,t-1} + \beta_3 GR_{i,t} + \beta_4 ROI_{i,t-1} + \beta_5 FS_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 \sigma CFO_{i,t} + \beta_8 \sigma NIBE_{i,t} + \beta_9 EQBETA_{i,t} + \beta_{10} PFSTAT_{i,t} + \varepsilon$$

TABLE XIII. SUMMARY OF REGRESSION RESULTS

Hypothesis	Regression Result	
	Accepted	*Unaccepted*
*H*1a: Pension plan risk based on value of pension liabilities has positive impact on cost of debt.		✓
*H*1b: Pension plan risk based on the difference between value of pension assets and value of pension liabilities has negative impact on cost of debt.		✓
*H*1c: Pension plan risk based on the difference between risk of pension assets and risk of pension liabilities has positive impact on cost of debt.		✓
*H*2a: Pension plan risk based on value of pension liabilities has positive impact on cost of equity.		✓
*H*2b: Pension plan risk based on the difference between value of pension assets and value of pension liabilities has negative impact on cost of equity.		✓
*H*2c: Pension plan risk based on the difference between risk of pension assets and risk of pension liabilities has positive impact on cost of equity.		✓

However, these values are not as large as other operational and financing expenses. Therefore, pension plan risk is not considered as important factor when investors respond to company's financial performance. These results differ from the research results [8] which found that investors have considered pension plan risk as an important factor when making investment decisions.

Control variables having a significant influence on COE are FS and σNIBE. FS has a negative influence on COE, which implies that as a company grows, the value of market capitalization grows, which means that the stock price increases. The higher stock price leads to the lower COE [14]. σNIBE has a negative influence on COE. Higher earnings volatility was correlated negatively with company's ability in predicting and expecting future earnings [24]. In addition, Minton et al. (2002) in [24] proved that higher earnings volatility led to management's demotivation to invest. This condition will finally decrease earnings. The decrease of earnings decreases the COE.

VI. DISCUSSION

According to all regression results with dependent variable COD, creditors do not consider pension plan risk based on the value of pension liabilities, the difference of values of pension assets and liabilities, and the difference of risk of pension assets and risk of pension liabilities. This may be attributed to the following factors. The value of pension liabilities (PR1) is not reported in the statement of financial position. Therefore, it is not significant for creditors. Second, creditors pay more attention to interest-bearing debts and debts related to external parties when determining the risk of payment default. Therefore, although the net value of pension liabilities (PR2) is reported in the statement of financial position, creditors do not focus on that value. In addition, the number of companies that have a pension plan was few compared with the total number of listed non-financial companies. In 2012, it was only about 15% of the total listed companies. These results show that creditors in Indonesian bond market do not consider pension plan risk when determining interest rate. These results differ from the research result [11], which found out that bond markets in U.S. and U.K. have higher spread sensitivity to companies with higher pension deficit.

All regression results with dependent variable COE show that investors do not consider pension plan risk based on the value of pension liabilities, the difference of values of pension assets and liabilities, and the difference of risk of pension assets pension liabilities, because when expecting a return (such as dividend), investors pay more attention to the bottom-line earnings and free cash flow after all of the expenditures. Pension contribution is only a small expenditure compared with other bigger operational or investment expenditures. Investors heed more to such bigger expenditures. These results differ from the results [8], which found that in U.S. capital market, pension plan risk has already been reflected in the overall firm risk.

VII. CONCLUSION

This study attempts to understand the impact of pension plan risk on the COD and COE based on the value of pension liabilities, the difference between the values of pension assets and liabilities, and the difference between the risks of pension assets and liabilities. Several studies in Indonesia do not focus on the impact of pension plan risk on the COD and COE.

According to all regression results, pension plan risk based on three measurements—value of the pension liabilities, the difference in the value between pension assets and liabilities, and the difference of risk between pension assets and liabilities—does not have a significant impact on COD and COE. These results imply that creditors and investors in Indonesian capital markets have not studied any information related to pension plan risk, and they do not consider such risk when making investment decisions. These results differ from the research that found the opposite results in both U.S. and U.K capital markets [8, 11]. Possible factors for pension plan risk not having a significant impact on COD are creditors paying more attention to interest-bearing debts and debts related to external parties when assessing default risk and the number of listed non-financial companies that had pension plans in Indonesia was still low, only approximately 15% of total firms (in 2012). One possible factor that causes pension plan risk not to have a significant impact on COE is that pension contributions affecting earnings and cash flow are relatively small when compared to bigger expenditures, such as investment, which means that pension plan risk does not capture investors' attention too much.

VIII. SUGGESTION

Further research is suggested to investigate the impact of pension plan risk on cost of debt and equity based on some COD and COE measurements to see the impact sensitivity based on each metric. In addition, higher sample and a longer research period are also suggested to obtain better results.

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