SUBJECT : **Sample computation on determining the reasonable rate of return (RROR) for the toll road industry**

Weighted Average Cost of Capital (WACC)

1. The cost of capital is the rate of return that debt/equity investors would require as compensation for its capital contribution on a project or a business. This is also the return that debt/equity investors would expect to earn for taking on a project or investment of comparable risk. However, if a project/business generates returns less than the cost of capital, then investors would be unlikely to take on the project/business, as they could receive higher returns from other alternative projects/businesses with a similar risk profile.

2. A business or project must generate an internal rate of return (IRR) at least equal to the cost of capital to be considered financially viable. WACC is calculated by proportionately weighting the cost of capital of lenders/debt investors and equity investors. Furthermore, WACC is used in financial modeling as the discount rate to calculate the net present value (NPV) of a project.[1]

3. The method for estimating the cost of capital is expressed by the weighted sum of the cost of equity (K_E) and cost of debt (K_D), as follows:

$$WACC = \left(\left(K_D \times \frac{D}{A} \right) \times (1 - t) \right) + \left(K_E \times \frac{E}{A} \right)$$

Table 1. WACC variables

Variable	Description
$WACC$	**Weighted average cost of capital** is the minimum rate of return that a business/project must generate to be considered financially viable.
K_D	**Cost of debt** is the rate of return that a company/bank provides to its debtholders and creditors.
K_E	**Cost of equity** is the rate of return on equity that shareholders may require in order to compensate for the risk of investing in a project. The cost of equity can be calculated using Capital Asset Pricing Model (CAPM).[2]

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[1] WACC formula, definition and uses - guide to cost of capital. (2020, March 1). Retrieved January 2021, from https://corporatefinanceinstitute.com/resources/knowledge/finance/what-is-wacc-formula/.

[2] CAPM is one of the several approaches that can be used in financial markets to quantify and translate risk into estimates of expected required return of return of an asset.

Variable	Description
D	**Debt** is the sum of all short- and long-term liabilities incurred by a company when running its business or implementing its projects. The debt ratio is calculated by getting the total debt and dividing by the total asset of the company. In the Philippine context, the book value of debt is recommended due to lack of financial data (e.g., insufficient data to determine the market value of debt considering that bulk of which was provided by commercial banks), and also considering that the country's stock market is driven by foreign funds.
E	**Equity** is the shareholder's equity representing the residual value of the company's assets minus its total liabilities. The equity ratio is calculated by getting the total shareholder's equity and dividing by the total asset of the company. In the Philippine context, the book value of shareholder's equity is recommended due to the illiquidity of bonds (e.g., listed corporate bonds are very illiquid).
A	**Asset** is the sum of the total short- and long-term liabilities and total shareholder's equity, i.e., Asset = Debt (Liabilities) + Equity (Shareholder's equity).
t	**Tax rate** is an allowable deduction from taxable income (e.g., corporate income tax rate).

4.   The succeeding items provide the detailed explanation on some of the common methodologies that the Secretariat may consider in determining each variable of WACC (i.e., K_D, K_E, debt-to-equity ratio, tax rate).

Estimating the cost of debt (K_D), $\left[WACC = \left(\left(K_D \times \frac{D}{A} \right) \times (1 - t) \right) + \left(K_E \times \frac{E}{A} \right) \right]$

5.   The cost of debt (K_D) is the rate of return that a company (e.g., lenders, banks) provides to its debtholders and creditors for any risk exposure that comes with lending money. The Secretariat may get the banks' actual indicative loan rate based on current market conditions for a project through market sounding. Notwithstanding, the following are some of the common approaches that the Secretariat may also consider in estimating the cost of debt (K_D):

Table 2. Methods in estimating cost of debt (K_D)

	Method	Description
a.	Yield to maturity (YTM)[3]	This is the hypothetical rate of return or interest rate of a fixed-rate security, such as bonds, that an investor would earn from investing in a bond and reinvesting every coupon at said rate. YTM enables investors to draw comparisons between different securities and its respective returns by understanding how changes in market conditions affect the investors' portfolios. One of the limitations, however, of using YTM is the availability of bond information if the company is not publicly listed and/or not actively trading.
b.	Credit rating[4]	This is the credit rating assigned by credit rating agencies such as S&P, Moody's, and Fitch, which may be used in estimating the cost of debt of companies by using YTM of bonds with the same credit rating and maturity. However, there may be difficulties in getting available credit rating information if the companies are not rated and/or bonds are not actively traded.
c.	Recent borrowing	This approach looks at the most recent borrowings made by the companies from banks and other financial institutions to estimate the credit spread to be used in calculating the cost of debt, as follows: $$K_D = R_F + Credit\ Spread$$ Wherein:

Variable	Description
R_F	**Risk-free rate** is the return on capital that investors expect to receive on investment with zero risk. The accepted estimate for this is the long-term public sector bond rate.
$Credit\ Spread$	**Credit spread** is the difference in returns due to different credit qualities. This can be obtained from Philippine Dealing System Holdings & Subsidiaries (PDS Group) website or in Bloomberg Terminal.[5]

This method, however, assumes a constant credit spread. Credit spread is not static, thus, can change over time depending on the market conditions. For instance, credit spreads increase during crisis as lenders may require higher return to account for the risk due to the uncertainty in future demand and a higher probability of default.

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[3] Cost of debt - how to calculate the cost of debt for a company. (2020, March 30). Retrieved April 26, 2021, from https://corporatefinanceinstitute.com/resources/knowledge/finance/cost-of-debt/

[4] Ibid.

[5] Bloomberg Terminal is a computer system that allows investors to access the Bloomberg data service, which provides real-time global financial data, news feeds, and messages.

Method	Description
d. Imputed interest rate	This method looks at the imputed interest rate or the effective interest rate (i.e., interest expense divided by the total debt) of companies in the same industry and with similar leverage.

6. Using the recent borrowing method, the cost of debt (K_D) is calculated by determining the latest risk-free-rate and the credit spread, as follows:

a. **Risk-free rate (R_F)**, $[K_D = R_F + Credit\ Spread]$. The latest PH BVAL Reference Rate can be gathered from the PDS website or the Bloomberg Terminal, as summarized in the table below:

Table 3. Risk-free rate (R_F)

Source	Risk-free rate[6] (in percent)
i. PDS website - 10-year R_F[7]	4.1287
ii. Bloomberg Terminal – BV10RPGB	4.1287

b. **Credit spread**, $[K_D = R_F + Credit\ Spread]$. The latest available loan rates issued to local toll concessionaires were gathered from the PDS Group website, as summarized in the table below:

Table 4. Credit spread

	Issuance[8]	Interest rate[9] (in percent) A	Tenor[10] (no. of years)	Risk free (R_F) rate[11] (in percent) B	Estimated credit spread (in percent) A - B
i.	NLEX Corporation – Fixed Rate Bonds Series A Due 2025 *(Issued on July 4, 2018)*	6.6407	7	6.2351 7-year R_F rate on July 4, 2018	0.4056
ii.	NLEX Corporation – Fixed Rate Bonds Series B Due 2028 *(Issued on July 4, 2018)*	6.9000	10	6.3500 10-year R_F rate on July 4, 2018	0.5500
				Median	**0.4778**

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[6] As of April 30, 2021

[7] PHP BVAL Reference Rates – Benchmark Tenors. (n.d.). Retrieved April 30, 2021, from https://www.pds.com.ph/index.html%3Fpage_id=56432.html

[8] Listed Corporate Securities. (2021, March 31). Retrieved April 30, 2021, https://www.pds.com.ph/wp-content/uploads/2019/04/Listed-Securities-as-of-March-31-2021.pdf

[9] Ibid.

[10] Prospectus for the issued bonds (2018, June 20). Retrieved April 30, 2021, https://www.pds.com.ph/wp-content/uploads/2018/07/22-NLEX-Corporation-Fixed-Rate-Bonds-due-2025-and-2028_final.pdf

[11] Philippine Treasury Reference Rates – PM (PDST-R2) from March 19, 2007 to October 26, 2018. Retrieved April 30, 2021, https://www.pds.com.ph/wp-content/uploads/2018/11/10-2018-PDST-R2-TABLE.pdf

7. **Cost of debt (K_D).** Using the estimated credit spread and the risk-free rate, the cost of debt (K_D) is calculated using the following formula:

$$K_D = R_F + Credit\ Spread$$

Table 5. Cost of debt (K_D) computation

Variable	Risk-free rate, R_F (10-year R_F rate as of April 2021) **A**	Credit Spread (Estimated credit spread as of July 2018) **B**	Cost of debt (K_D) **A + B**
Rate (in percent)	4.1287	0.4778	**4.6065**

As mentioned in Table 2, credit spread can change over time depending on the market conditions, **thus, it is best to gather the most recent loan rates from local toll concessionaires for a more robust estimate of the cost of debt.** Notwithstanding, the calculated cost of debt (K_D) that may be used in the computation of cost of capital is **4.61 percent**.

Estimating the cost of equity, (K_E) $\left[WACC = \left(\left(K_D \times \frac{D}{A} \right) \times (1 - t) \right) + \left(K_E \times \frac{E}{A} \right) \right]$

8. The cost of equity (K_E) is the rate of return on equity that shareholders may require in order to compensate for the risk of investing in a project. The cost of equity can be calculated according to the risk level of the company by using CAPM with the following formula:

$$K_E = R_F + (\beta_E\ x\ ERP)$$

Table 6. Cost of equity (K_E) variables

Variable	Description
K_E	**Cost of equity** is the rate of return on equity that shareholders may require in order to compensate for the risk of investing in a project. This is the required return on assets commensurate with level of associated systematic risk.
R_F	**Risk-free rate** is the return on capital that investors expect to receive on investment with zero risk. The accepted estimate for this is the long-term Public Sector Bond rate.
β_E	**Beta of equity** measures the volatility of the returns of an equity security in relation to the performance of the overall market. This captures the degree of systematic risk of a company/project.
ERP	**Expected Risk Premium (ERP)** is the required premium over the risk-free rate for investors to invest equity on a business or project instead of government bonds. This is the difference between R_F and the R_M, i.e., the expected or average market return.

a. **Risk-free rate (R$_F$),** $[K_E = R_F + (\beta_E \times ERP)]$. The same Philippine BVAL Reference Rate as used in item 6.a [i.e., in the computation of the cost of debt (K$_D$)] will also be used in calculating the cost of equity (K$_E$).

b. **Beta of equity (β$_E$),** $[K_E = R_F + (\beta_E \times ERP)]$. The pure-play method is an approach used by financial analysts to estimate the beta coefficient of companies whose stock is not publicly traded. As such, noting that local toll concessionaires that venture in the financing, designing, constructing, and operating toll expressway projects in the Philippines are not publicly listed nor actively trade in the Philippine Stock Exchange (PSE), the pure-play method will then be used to find other comparable publicly traded companies and adjust their betas for financial leverage differences, as follows:

Pure-play method

i. Step 1. Select comparable toll companies. **Table 7** provides the list of comparable toll expressway concessionaires within the same industries (i.e., companies with highways, expressways, toll, bridge, tunnel management as primary industry) from emerging markets[12] in the Asia Pacific Region, which would be considered in estimating the beta of equity.

Table 7. Toll expressway concessionaires in the Asia Pacific Region

Country	Company name
China/ Hongkong	1. Anhui Expressway Co Ltd
	2. Anhui Gourgen Traffic Construction Co Ltd
	3. Chengdu Expressway Co Ltd
	4. China Communications Construction Co Ltd
	5. Chongqing Construction Engineering Group Corp Ltd
	6. Chongqing Road & Bridge Co Ltd
	7. City Development Environment Co Ltd
	8. Dongguan Development Holdings Co Ltd
	9. Fujian Expressway Development Co Ltd
	10. Guangdong Provincial Expressway Development Co Ltd
	11. Guangxi Wuzhou Communications Co Ltd
	12. Henan Zhongyuan Expressway Co Ltd
	13. Huayu Expressway Group Ltd
	14. Hubei Chutian Smart Communication Co Ltd
	15. Hunan Investment Group Co Ltd
	16. Jiangsu Expressway Co Ltd

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[12] Based on the Bloomberg Industry Classification Standard (BICS) wherein publicly listed companies were organized into consistent peer groups according to specific activities and risk categories.

Country	Company name
	17. Jiangxi Ganyue Expressway Co Ltd
	18. Shandong Hi-speed Co Ltd
	19. Shenzhen Expressway Co Ltd
	20. Sichuan Expressway Co Ltd
	21. Zhejiang Expressway Co Ltd
India	22. Dilip Buildcon Ltd
	23. IRB Infrastructure Developers Ltd
	24. KNR Constructions Ltd
	25. MEP Infrastructure Developers Ltd
Indonesia	26. Citra Marga Nusaphala Persada Tbk PT
	27. Jasa Marga Persero Tbk PT
	28. Nusantara Infrastructure Tbk PT
Malaysia	29. Lingkaran Trans Kota Holdings Bhd
Thailand	30. Bangkok Expressway & Metro PCL
Vietnam	31. CII Bridges & Roads Joint Stock Company (JSC)
	32. Cuongthuan Investment Corp
	33. Hai Van Tunnel Management and Operation JSC
	34. IDICO Infrastructure Development Investment JSC
	35. Tasco JSC

ii. <u>Step 2. Estimate the comparables' beta</u>. The levered betas[13] (β_L) measured over five years (e.g., from April 2016 to April 2021 as used in this exercise) of the comparable toll companies were obtained from the Bloomberg Terminal, as summarized in **Table 8**.

Table 8. Levered betas (β_L) of toll expressway concessionaires in the Asia Pacific Region

Company name	Levered beta (β_L)
1. Anhui Expressway Co Ltd	0.82
2. Anhui Gourgen Traffic Construction Co Ltd	1.16
3. Chengdu Expressway Co Ltd	0.42
4. China Communications Construction Co Ltd	0.93
5. Chongqing Construction Engineering Group Corp Ltd	1.11
6. Chongqing Road & Bridge Co Ltd	0.99
7. City Development Environment Co Ltd	1.01
8. Dongguan Development Holdings Co Ltd	0.93
9. Fujian Expressway Development Co Ltd	0.77
10. Guangdong Provincial Expressway Development Co Ltd	0.55
11. Guangxi Wuzhou Communications Co Ltd	1.00
12. Henan Zhongyuan Expressway Co Ltd	0.97
13. Huayu Expressway Group Ltd	0.49

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[13] Levered beta (a.k.a. equity beta) is used to compare the volatility of returns of a company's stock against the international market. This measures the risk while taking into consideration the impact of the company's capital structure and leverage.

	Company name	Levered beta (β_L)
14.	Hubei Chutian Smart Communication Co Ltd	0.82
15.	Hunan Investment Group Co Ltd	0.87
16.	Jiangsu Expressway Co Ltd	0.60
17.	Jiangxi Ganyue Expressway Co Ltd	0.84
18.	Shandong Hi-speed Co Ltd	0.89
19.	Shenzhen Expressway Co Ltd	0.76
20.	Sichuan Expressway Co Ltd	0.82
21.	Zhejiang Expressway Co Ltd	0.93
22.	Citra Marga Nusaphala Persada Tbk PT	0.50
23.	Jasa Marga Persero Tbk PT	1.22
24.	Nusantara Infrastructure Tbk PT	0.87
25.	Dilip Buildcon Ltd	1.10
26.	IRB Infrastructure Developers Ltd	1.22
27.	KNR Constructions Ltd	0.87
28.	MEP Infrastructure Developers Ltd	1.05
29.	Lingkaran Trans Kota Holdings Bhd	0.57
30.	Bangkok Expressway & Metro PCL	0.97
31.	CII Bridges & Roads JSC	0.42
32.	Cuongthuan Investment Corp	0.66
33.	Hai Van Tunnel Management and Operation JSC	0.95
34.	IDICO Infrastructure Development Investment JSC	0.54
35.	Tasco JSC	1.00

Table 8 shows that 9 out of 35 comparable toll expressway concessionaires have levered betas (β_L) greater than one, which means that these companies' stock returns react disproportionately to the market (i.e., riskier/more volatile than the other companies).

iii. <u>Step 3. Unlever the comparables' beta</u>. The levered betas (β_L) of the comparable toll companies will then be unlevered to remove the financial risk component (i.e., debt), thus leaving the business risk component of the beta, by using the following formula:

$$\beta_U = \beta_L \times \left[\frac{1}{1 + \left((1 - T) \times \left({}^{D}/_{E} \right) \right)} \right]$$

Table 9. Unlevered beta (β_U) computation variables

Variable	Description
β_L	**Levered beta** (i.e., equity beta) is used to compare the volatility of returns of a company's stock against the international market. This measures the risk while taking into consideration the impact of the

Variable	Description
	company's capital structure and leverage. The riskier the project, the higher the equity beta (i.e., greater than 1).
β_U	**Unlevered beta** (i.e., asset beta) is the beta of a company without the impact of financial leverage (e.g., debt). This measures the volatility of an unlevered company in relation to the market.
$\dfrac{D}{E}$	**Debt-to-equity ratio** or the capital structure of each toll expressway concessionaire, which can be obtained from Reuters/Bloomberg websites or the Bloomberg Terminal. This is the total debt (i.e., both short and long term) divided by total shareholders' equity.[14]
T	**Tax rate** is the rate imposed on the taxable income of corporations. The taxable income is calculated as corporate receipts less deductions for labor costs, materials, and depreciation of capital assets[15]. This can be obtained from Reuters/Bloomberg websites or the Bloomberg Terminal.

Using the levered betas (β_L) identified in **Table 8** and the pertinent financial information, such as statutory tax rates and capital structures (i.e., debt-to-equity ratio) gathered from the Bloomberg Terminal, the unlevered betas (β_U) for each foreign toll expressway concessionaire were calculated, as summarized in **Table 10**.

Table 10. Unlevered betas (β_U) of toll expressway concessionaires in the Asia Pacific Region

Company name	Bloomberg Terminal data			NEDA computation
	D/E	Tax rate	Levered beta (β_L)	Unlevered beta (β_U)
1. Anhui Expressway Co Ltd	0.19	25.00	0.82	0.72
2. Anhui Gourgen Traffic Construction Co Ltd	1.07	25.00	1.16	0.65
3. Chengdu Expressway Co Ltd	0.79	25.00	0.42	0.26
4. China Communications Construction Co Ltd	1.22	25.00	0.93	0.49
5. Chongqing Construction Eng'g Group Corp Ltd	1.75	15.00	1.11	0.45
6. Chongqing Road & Bridge Co Ltd	0.59	15.00	0.99	0.66
7. City Development Environment Co Ltd	0.99	25.00	1.01	0.58
8. Dongguan Development Holdings Co Ltd	0.38	25.00	0.93	0.73
9. Fujian Expressway Development Co Ltd	0.19	25.00	0.77	0.67
10. Guangdong Provincial Expressway Dev't Co Ltd	0.67	25.00	0.55	0.36
11. Guangxi Wuzhou Communications Co Ltd	0.97	25.00	1.00	0.58
12. Henan Zhongyuan Expressway Co Ltd	2.66	25.00	0.97	0.32
13. Huayu Expressway Group Ltd	1.68	23.54	0.49	0.21
14. Hubei Chutian Smart Communication Co Ltd	0.84	25.00	0.82	0.50
15. Hunan Investment Group Co Ltd	0.08	25.00	0.87	0.82
16. Jiangsu Expressway Co Ltd	0.74	24.98	0.60	0.39
17. Jiangxi Ganyue Expressway Co Ltd	0.61	25.00	0.84	0.58

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[14] RR732 – Total debt to total equity definition. Retrieved from the Bloomberg Terminal
[15] IM156 – Statutory tax rate definition. Retrieved from the Bloomberg Terminal

| Company name | Bloomberg Terminal data | | | NEDA computation |
	D/E	Tax rate	Levered beta (β_L)	Unlevered beta (β_U)
18. Shandong Hi-speed Co Ltd	1.22	25.00	0.89	0.46
19. Shenzhen Expressway Co Ltd	0.67	25.00	0.76	0.51
20. Sichuan Expressway Co Ltd	1.12	15.99	0.82	0.42
21. Zhejiang Expressway Co Ltd	1.41	25.00	0.93	0.45
22. Citra Marga Nusaphala Persada Tbk PT	0.68	25.00	0.50	0.33
23. Jasa Marga Persero Tbk PT	2.56	22.00	1.22	0.41
24. Nusantara Infrastructure Tbk PT	0.42	25.00	0.87	0.66
25. Dilip Buildcon Ltd	2.53	30.00	1.10	0.40
26. IRB Infrastructure Developers Ltd	1.37	30.00	1.22	0.62
27. KNR Constructions Ltd	0.52	30.00	0.87	0.64
28. MEP Infrastructure Developers Ltd	9.52	30.00	1.05	0.14
29. Lingkaran Trans Kota Holdings Bhd	0.73	24.00	0.57	0.37
30. Bangkok Expressway & Metro PCL	1.82	20.00	0.97	0.39
31. CII Bridges & Roads JSC	1.38	20.00	0.42	0.20
32. Cuongthuan Investment Corp	2.05	20.00	0.66	0.25
33. Hai Van Tunnel Management and Operation JSC	2.86	20.00	0.95	0.29
34. IDICO Infrastructure Dev't Investment JSC	2.10	20.00	0.54	0.20
35. Tasco JSC	1.86	20.00	1.00	0.40

    iv.   <u>Step 4. Lever the beta for the project's financial risk</u>. The calculated unlevered betas will then be re-levered to the debt-to-equity ratio of the project proponent/concessionaire and tax rate by using the following formula as derived from the formula in item 8.b.iii:

$$\beta_L = \beta_U \; x \; (1 + ((1 - T) \; x \; (D / E)))$$

The table below summarized the calculated relevered betas (β_L) using 70:30[16] debt-to-equity ratio and 30 percent tax rate.

Table 11. Re-levered betas (β_L) of toll expressway concessionaires in the Asia Pacific Region

| Company name | Bloomberg Terminal Data | | | NEDA computation | |
	D/E	Tax rate	Levered beta (β_L)	Unlevered beta (β_U)	Relevered beta (β_L)
1. Anhui Expressway Co Ltd	0.19	25.00	0.82	0.72	1.90
2. Anhui Gourgen Traffic Construction Co Ltd	1.07	25.00	1.16	0.65	1.70
3. Chengdu Expressway Co Ltd	0.79	25.00	0.42	0.26	0.69
4. China Communications Construction Co Ltd	1.22	25.00	0.93	0.49	1.28
5. Chongqing Construction Eng'g Group Corp Ltd	1.75	15.00	1.11	0.45	1.18

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[16] Assumed for illustration purposes but should be determined based on the capital structure of the project concessionaire based on the submitted financial statements

Company name	Bloomberg Terminal Data			NEDA computation	
	D/E	Tax rate	Levered beta (β_L)	Unlevered beta (β_U)	Relevered beta (β_L)
6. Chongqing Road & Bridge Co Ltd	0.59	15.00	0.99	0.66	1.73
7. City Development Environment Co Ltd	0.99	25.00	1.01	0.58	1.53
8. Dongguan Development Holdings Co Ltd	0.38	25.00	0.93	0.73	1.92
9. Fujian Expressway Development Co Ltd	0.19	25.00	0.77	0.67	1.77
10. Guangdong Provincial Expressway Dev't Co Ltd	0.67	25.00	0.55	0.36	0.96
11. Guangxi Wuzhou Communications Co Ltd	0.97	25.00	1.00	0.58	1.53
12. Henan Zhongyuan Expressway Co Ltd	2.66	25.00	0.97	0.32	0.85
13. Huayu Expressway Group Ltd	1.68	23.54	0.49	0.21	0.56
14. Hubei Chutian Smart Communication Co Ltd	0.84	25.00	0.82	0.50	1.32
15. Hunan Investment Group Co Ltd	0.08	25.00	0.87	0.82	2.16
16. Jiangsu Expressway Co Ltd	0.74	24.98	0.60	0.39	1.02
17. Jiangxi Ganyue Expressway Co Ltd	0.61	25.00	0.84	0.58	1.52
18. Shandong Hi-speed Co Ltd	1.22	25.00	0.89	0.46	1.22
19. Shenzhen Expressway Co Ltd	0.67	25.00	0.76	0.51	1.34
20. Sichuan Expressway Co Ltd	1.12	15.99	0.82	0.42	1.11
21. Zhejiang Expressway Co Ltd	1.41	25.00	0.93	0.45	1.19
22. Citra Marga Nusaphala Persada Tbk PT	0.68	25.00	0.50	0.33	0.86
23. Jasa Marga Persero Tbk PT	2.56	22.00	1.22	0.41	1.07
24. Nusantara Infrastructure Tbk PT	0.42	25.00	0.87	0.66	1.73
25. Dilip Buildcon Ltd	2.53	30.00	1.10	0.40	1.04
26. IRB Infrastructure Developers Ltd	1.37	30.00	1.22	0.62	1.63
27. KNR Constructions Ltd	0.52	30.00	0.87	0.64	1.68
28. MEP Infrastructure Developers Ltd	9.52	30.00	1.05	0.14	0.36
29. Lingkaran Trans Kota Holdings Bhd	0.73	24.00	0.57	0.37	0.97
30. Bangkok Expressway & Metro PCL	1.82	20.00	0.97	0.39	1.04
31. CII Bridges & Roads JSC	1.38	20.00	0.42	0.20	0.52
32. Cuongthuan Investment Corp	2.05	20.00	0.66	0.25	0.66
33. Hai Van Tunnel Management and Operation JSC	2.86	20.00	0.95	0.29	0.76
34. IDICO Infrastructure Dev't Investment JSC	2.10	20.00	0.54	0.20	0.53
35. Tasco JSC	1.86	20.00	1.00	0.40	1.05
				Median	**1.18**

The calculated median of re-levered beta (i.e., **1.18**) will be used in estimating the cost of capital in this exercise.

c. **Expected risk premium (ERP),** $[K_E = R_F + (\beta_E \times ERP)]$. ERP is the additional return or premium demanded by investors to compensate them for the risk associated with investing in a project. The following are some of the methods in estimating ERP:

Table 12. Methods in estimating ERP

Method	Description
i. Historical ERP	This is a backward-looking approach wherein the actual ERP observed over a long period of time, including full bear and bull market cycles[17], is assumed as a good indicator of the expected ERP. This is the difference between the historical risk-free rate (R_F) and the expected or average market return (R_M), as provided in the formula below: $$ERP = R_M - R_F$$ One of the limitations of this method, however, is that the level of risk of the stock index may change over time.
ii. Dividend discount model (DDM)[18]	This is a quantitative method of valuing a company's stock price based on the assumption that the current stock market price is equal to the present value of all the company's future dividends.
iii. Macroeconomic model	This a top-down approach based on the assumption that the expected market return (RM) and/or ERP is a function of macroeconomic indicators [e.g., Gross Domestic Product (GDP), inflation rate, price to earnings (P/E), among others].

By using methods 1 and 2, the calculated ERP to be used in estimating the cost of equity (K_E) is **6.46 percent**, i.e., the average result of methods 1 and 2, as detailed below:

i. <u>Method 1: Historical ERP.</u> ERP was calculated by gathering the average risk-free rate (R_F) and expected market return (R_M) from March 2011 to April 2021 in the Bloomberg Terminal. The summary of the result is provided in **Table 13**.

Table 13. Historical ERP

Variables	Rate, in percent
a. Expected market return (R_M) *Average value from March 2011 to April 2021*	9.20
b. Risk-free rate (R_F) *Average value from March 2011 to April 2021*	5.50
Historical ERP	**3.70**

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[17] A bear market is a period characterized by a sustained fall in stock prices, thus investors are willing to pay more for stocks, expecting stock prices to continue increasing. On the other hand, a bull market is a period characterized by a sustained rise in stock prices.

[18] Dividend discount model - definition, formulas and variations. (2020, September 26). Retrieved April 29, 2021, from https://corporatefinanceinstitute.com/resources/knowledge/valuation/dividend-discount-model/

ii. <u>Method 2: Dividend discount model (DDM).</u> DDM is one of the basic valuation proprietary functions in Bloomberg Terminal, providing calculations for stages of growth, interest rates, risk premiums and growth rate. The result of the DDM computation in Bloomberg as of April 30, 2021 is provided in the table below.

Table 14. Dividend discount model (DDM)

Variables	Rate, in percent
a. Dividend yield	1.56
b. Growth rate	18.65
c. Dividend payout ratio	35.24
d. Expected market return (R_M)	13.57
e. Risk-free rate (R_F)	4.13
ERP	**9.22**

9. **Cost of equity (K_E).** Using the estimated beta of equity, ERP, and the risk-free rate, the cost of equity (K_E) is calculated using the following formula:

$$K_E = R_F + (\beta_E \times ERP)$$

Table 15. Cost of equity (K_E) computation

Variable	Risk-free rate, R_F (10-year R_F rate as of April 2021) A	(re-levered) Beta of equity, (β_E) (As of April 2021) B	ERP (Average of methods 1 and 2) C	Cost of equity (K_E) A + (B x C)
Rate (in percent)	4.13	1.18	6.46	**11.75**

Estimating the cost of capital $\left[WACC = \left(\left(K_D \times \frac{D}{A} \right) \times (1 - t) \right) + \left(K_E \times \frac{E}{A} \right) \right]$

10. The calculated WACC is **5.78 percent** using the above formula and using all the financial data and information gathered, as summarized in the table below:

Table 16. Summary of financial information for WACC computation

Variables	Unit	Value	Remarks
a. Cost of debt (K_D)	percent	**4.61**	This is the sum of the risk-free rate and credit spread. (See item 7)
i. Risk-free rate (R_F)	percent	4.13	This is based on the latest 10-year PH BVAL risk-free rate. (See item 6.a)
ii. Credit spread	percent	0.48	This is based on the latest available loan rates in PDS website. (See item 6.b)

Variables	Unit	Value	Remarks
b. Cost of equity (K$_E$)	percent	**11.75**	This is calculated using the same risk-free rate as used in cost of debt. (See item 8)
i. *Beta of equity (β_E)*	*unit*	*1.18*	This is the re-levered Beta calculated using pure-play method. (See item 8.b)
ii. *Expected risk premium (ERP)*	*percent*	*6.46*	This is the average ERP based on the result of the historical ERP and DDM methods. (See item 8.c)
c. Tax rate	percent	**30.00**	This is an assumed corporate income tax rate[19] in the Philippines.
d. Weight of debt, D/A	percent	**70.00**	This is an assumed gearing ratio or capital structure for a project.
e. Weight of equity, E/A	percent	**30.00**	
Cost of capital (WACC)	**percent**	5.78	This is the calculated weighted average cost of capital as of the latest available financial information used in this exercise.

11. Based on the sample computation, the estimated WACC of local toll companies assuming a D/E of 70:30, is **5.78 percent**.

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[19] Income tax - Bureau of Internal Revenue. Retrieved April 30, 2021, from
https://www.bir.gov.ph/index.php/tax-information/income-tax.html