January 11, 2011

CDM Executive Board
c/o UNFCCC Secretariat
P.O. Box 260124
D-53153 Bonn
Germany

Subject: Public inputs on the draft revision to the Guidelines on the Assessment of Investment Analysis

Honorable Members of the CDM Executive Board,

I welcome the opportunity to contribute to the development of a transparent guidance on the assessment of investment analysis. I understand that said guidance will be welcomed by DOEs and PPs alike in order to clarify the procedures, tools and best practice examples that are acceptable for the demonstration and assessment of additionality.

Specifically, the purpose of these notes is to provide an example were at least one of the proposed default values for the benchmark analysis is significantly *smaller* than the values I obtained from the application of models/tools that are common-practice in financial analysis. I am concerned that a potentially large number of additional projects will be left out of the CDM, deterring investments that are highly needed in developing countries.

Lastly, I would also like to submit the approach followed in these notes for consideration of the team that is working on the Draft "Tool to calculate the weighted average cost of capital (WACC)", as the discussion on expected return on equity presented herein may also be useful for the purpose of determining the WACC.

I will be glad to provide any further information and clarifications as necessary.

Kind regards,

Martín Rodríguez Marat
CDM Advisor – Financial Specialist
Geo Ingeniería, Ingenieros Consultores
La Uruca – San José - Costa Rica

Geo Ingeniería
INGENIEROS CONSULTORES S.A.

Introduction: expected return on equity

According to the Capital Asset Pricing Model (CAPM), expected return on equity is obtained as follows:

(0.1) $$r_e = r_f + \beta_j (r_m - r_f) + s$$

where:

r_e: Expected return on equity

r_f: Risk free investment *in the same country where the project is located*

β_j: Sectorial beta for the *j* sector

r_m: market return

s: size premium (only applicable to projects from small companies, as discussed below).

Each of the three terms in the above equation are discussed below. An example is provided in order to clarify the applicability of the procedure and to provide comparisons with the results given in the proposed default values for the expected return on equity.

i) The risk free rate (r_f)

The first term on equation (0.1) is the risk free return applicable *in the country where the project is being undertaken*. The following aspects are expected from a risk free rate relevant for a specific project:

i) The risk free rate should reflect the safest investment in the country. Although there may be exceptions, this is usually provided by government bonds.

ii) The maturity of the risk free rate should be comparable to the one from the project.

A recurrent problem in emergent countries, however, is that the maturity of government bonds is usually short-termed. For example, the results of the most recent competitive bids for long-term bonds from the Nicaraguan Ministry of Treasury and Public Credit are shown below[1] on Table 1. The largest maturity available for these bonds is 5 years, corresponding to the public bid held on

[1] This and previous results may be obtained in http://www.bcn.gob.ni/index.php (direct link to file: http://www.bcn.gob.ni/titulos_valores/subastas/letras%20MHCP/Resultados/2009/resultadosBonos1.pdf)

April 22nd, 2009, which is considerably smaller than the 30-40 years of expected lifetime for projects like hydro power plants, wind farms, etc. Therefore, the problem is that a longer maturity government bond is required, but these are not available in many developing countries.

Table 1 – Government bond returns

Ministerio de Hacienda y Crédito Público
Tesorería General de la República

RESULTADOS DE SUBASTAS COMPETITIVA DE BONOS[1)]
2009
Millones de Dólares

Número de Subasta	Fecha	Código ISIN	Código de Emisión	Plazo Original (Años)	Días al Vencimiento	Posturas Aceptadas	Monto Adjudicado	Precio (%) Promedio Ponderado Adjudicado	Tasa de Rendimiento (%) Promedio Ponderada Adjudicada
STVGE-14-01-09	14-Ene-09	NIMHCP0B0064	MHCP-B-02-07-11	3	897	3	0.03	99.124%	10.401%
STVGE-21-01-09	21-Ene-09	NIMHCP0B0064	MHCP-B-02-07-11	3	890	4	0.04	99.109%	10.414%
STVGE-28-01-09	28-Ene-09	NIMHCP0B0064	MHCP-B-02-07-11	3	883	2	0.02	99.201%	10.375%
SUBTOTAL ENERO						**9**	**0.09**		
STVGE-004-2009	04-Feb-09	NIMHCP0B0064	MHCP-B-02-07-11	3	876	3	0.03	99.262%	10.350%
STVGE-005-2009	11-Feb-09	NIMHCP0B0064	MHCP-B-02-07-11	3	869	4	0.04	99.293%	10.340%
STVGE-006-2009	18-Feb-09	NIMHCP0B0064	MHCP-B-02-07-11	3	862	4	0.04	99.332%	10.325%
STVGE-007-2009 2/	25-Feb-09	NIMHCP0B0064	MHCP-B-02-07-11	3	855	0	0.00	0.000%	0.000%
SUBTOTAL FEBRERO						**11**	**0.11**		
STVGE-008-2009	11-Mar-09	NIMHCP0B0064	MHCP-B-02-07-11	3	841	3	0.27	98.120%	10.949%
STVGE-009-2009	25-Mar-09	NIMHCP0B0064	MHCP-B-02-07-11	3	827	0	0.00	0.000%	0.000%
SUBTOTAL MARZO						**3**	**0.27**		
STVGE-010-2009	01-Abr-09	NIMHCP0B0064	MHCP-B-02-07-11	3	820	1	0.40	98.071%	11.000%
STVGE-011-2009	22-Abr-09	NIMHCP0B0075	MHCP-B-25-10-13	5	1645	1	1.50	93.207%	12.000%
SUBTOTAL ABRIL						**2**	**1.90**		
STVGE-012-2009	06-May-09	NIMHCP0B0064	MHCP-B-02-07-11	3	785	2	0.02	98.195%	10.975%
SUBTOTAL MAYO						**2**	**0.02**		
SVGD-013-2009	29-Jul-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1085	1	0.80	97.533%	11.000%
SUBTOTAL JULIO						**1**	**0.80**		
SVGD-014-2009 2/	12-Ago-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1071	0	0.00	0.000%	0.000%
SVGD-015-2009 2/	26-Ago-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1057	0	0.00	0.000%	0.000%
SUBTOTAL AGOSTO						**0**	**0.00**		
SVGD-016-2009	09-Sep-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1043	4	0.04	98.812%	10.500%
SVGD-017-2009	23-Sep-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1029	3	1.52	99.412%	10.253%
SUBTOTAL SEPTIEMBRE						**7**	**1.56**		
SVGD-018-2009	07-Oct-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1015	3	0.03	98.839%	10.500%
SVGD-019-2009	21-Oct-09	NIMHCP0B0093	MHCP-B-20-07-12	3	1001	4	0.04	98.850%	10.500%
SVGF-020-2009	28-Oct-09	NIMHCP0B0064	MHCP-B-02-07-11	3	610	4	0.04	100.000%	10.003%
SUBTOTAL OCTUBRE						**11**	**0.11**		
SVGD-021-2009	04-Nov-09	NIMHCP0B0093	MHCP-B-20-07-12	3	987	3	0.03	99.778%	10.100%
SVGF-022-2009	18-Nov-09	NIMHCP0B0075	MHCP-B-25-10-13	5	1435	0	0.00	0.000%	0.000%
SUBTOTAL NOVIEMBRE						**3**	**0.03**		
Total			**MHCP-B-02-07-11**	**3**		**30**	**0.93**		
			MHCP-B-25-10-13	**5**		**1**	**1.50**		
			MHCP-B-20-07-12	**3**		**18**	**2.46**		
Total						**49**	**4.89**		

1/ : Títulos denominados en Dólares y pagaderos en Córdobas al Tipo de Cambio Oficial.
2/ :No se presentaron ofertas a esta subasta.

A common approach used in finance[2] consists in estimating a hypothetical government bond with longer maturity by observing the spread between two similar bonds (one from the host country and another from a country where long-maturity bonds are available) and then adding this spread to the long-term return from the country with available information. Typically, the country with more information is the United States. Thus, in our example:

(0.2) $$(1+r_{NI}^{5yr}) = (1+r_{US}^{5yr}) \cdot (1+\rho)$$

where:

r_{NI}^{5yr} is the Nicaraguan interest rate for 5 year bonds denominated in US dollars (= 0.12; only one data point available)

r_{US}^{5yr} is the US interest rate for 5 year bonds (average for over 4 years of latest available information is presented on the data sheet attached; this value equals 0.0369)

ρ is the country risk premium

Thus, the risk premium is obtained from the previous equation, resulting in:

$$1+\rho = \frac{1+r_{NI}^{5yr}}{1+r_{US}^{5yr}} = 1.0801$$

Hence, we may obtain our (hypothetical) Nicaraguan 30 year maturity using the same approach[3]:

(0.3) $$(1+r_{NI}^{30yr}) = (1+r_{US}^{30yr}) \cdot (1+\rho)$$

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[2] The Ibbotson 2009 Valuation Yearbook states that: "Another international model in current use is the country-spread model. While it takes many forms, this model adds a country-specific spread to a cost of equity determined from more conventional means. Typically, a cost of equity is determined using U.S. data, then a spread is added to the cost of equity to 'internationalize' it. Ideally, the spread is between the yield on dollar-denominated foreign bonds and the yield on the U.S. Treasury bond" (page 121).

[3] It is important to remark that this is a conservative approach, as we are assuming that the risk premium ρ is constant, which is not likely the case in developing countries like Nicaragua (where the country risk premium could be higher for bonds with longer maturity)

As r_{US}^{30yr} = 0.0454 (available in spreadsheet attached), then we have that r_{NI}^{30yr} = 0.1291, which is our risk-free rate applicable for our example, i.e a 30 year maturity Nicaraguan bond.

ii) Equity premium (r_m - r_f) and industry beta (β_j)

In order to estimate the equity risk premium, Ibbotson subtracts the arithmetic mean of government bond income return from the arithmetic mean of the stock market total return. Standard & Poor's 500 (S&P 500) index is used as a proxy for market return[4]. The table below shows the equity risk premium obtained using this index.

Excerpt 1 – Equity risk premium

Table 5-1: Equity Risk Premium with Different Market Indices

	Equity Risk Premia		
	Long-Horizon (%)	Intermediate-Horizon (%)	Short-Horizon (%)
S&P 500	6.47	6.95	7.92
Total Value-Weighted NYSE	6.26	6.73	7.71
NYSE Deciles 1–2	5.80	6.27	7.24

Data from 1926–2008.

Source: Page 56 on Morningstar's Ibbotson Stocks, Bonds, Bills and Inflation 2009 Valuation Yearbook

On the other hand, *betas* measure a security's (or a portfolio) sensitivity to the market as a whole, i.e. the change in the expected return for assets in industry *j* per unitary change in the market premium. Exhibited below are the statistics for companies classified under SIC Code 4911 for 2009 from Morningstar's Ibbotson 2009 Cost of Capital Yearbook, which shows a Large Composite

[4] "Widely regarded as the best single gauge of the U.S. equities market, this world-renowned index includes 500 leading companies in leading industries of the U.S. economy. Although the S&P 500 focuses on the large cap segment of the market, with approximately 75% coverage of U.S. equities, it is also an ideal proxy for the total market" (*Source:* S&P 500 fact sheet, available at:

http://www2.standardandpoors.com/spf/pdf/index/SP_500_Factsheet.pdf).

Levered Adjusted Beta of 0.52 (on the right side at the bottom of the page). Notice that as the S&P 500 (used for the equity premium) comprises large companies, a large composite beta has been used to maintain homogeneity in calculations. Likewise, *levered* beta was used as equity IRRs consider debt/interests cash flows (levered scenario). Notice that the higher beta reflects the fact that equity investors from levered companies demand *higher* returns since debt payments have priority over dividend payments.

Excerpt 2 - Sectoral betas

Statistics For SIC Code 4911

Electric Services
This Industry Comprises 46 Companies

Data through September 2009

Industry Description

Establishments engaged in the generation, transmission, and/or distribution of electric energy for sale.

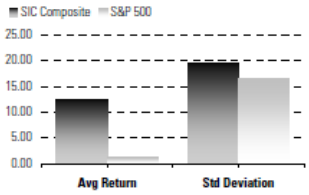
Sales (million$)

Total	306,153
Average	6,655.5
Three Largest Companies	
CONSTELLATION ENERGY GRP INC	19,818.3
EXELON CORP	18,859.0
SOUTHERN CO	17,127.0
Three Smallest Companies	
POWERSECURE INTL INC	135.4
MAINE & MARITIMES CORP	45.3
AMEN PROPERTIES INC	4.5

Total Capital (million$)

Total	571,105
Average	12,415.3
Three Largest Companies	
EXELON CORP	45,941.5
SOUTHERN CO	44,679.0
DOMINION RESOURCES INC	38,223.2
Three Smallest Companies	
MAINE & MARITIMES CORP	93.7
AMEN PROPERTIES INC	15.8
COMMERCE ENERGY GROUP INC	0.1

SIC vs. S&P 500 for Last 10 Years (%)



Number of Companies & Total Capital (billion$)

S&P Debt Rating	Large Cap	Mid Cap	Low Cap	Micro Cap	Totals	
AAA, AA, A	3	2	0	0	5	(companies)
	117.8	11.1	0.0	0.0	128.8	(capital)
BBB	10	11	7	0	28	
	273.2	106.2	16.1	0.0	395.5	
BB, B, CCC, CC, D	1	2	2	1	6	
	16.7	13.4	10.9	0.4	41.4	
Not Rated	0	0	2	5	7	
	0.0	0.0	4.5	0.8	5.3	
Totals	14	15	11	6	46	
	407.7	130.7	31.5	1.2	571.1	

Annualized Statistics for Last 10 Years (%)

	Avg Return	Std Deviation
S&P 500	1.19	16.52
SIC Composite	12.36	19.47
Large Composite	13.56	20.47
Small Composite	16.58	24.91

Compound Annual Equity Return (%)

	5 Years	10 Years
75th Percentile	8.55	8.94
Median	4.76	5.69
25th Percentile	1.04	3.55
SIC Composite	8.00	10.60
Large Composite	8.49	11.77
Small Composite	15.90	14.00

Sales, Income & Market Capitalization (billion$)

	Sales	Operating Income	Net Income	Equity Capital	Debt Capital
Current Yr.	306.2	71.9	20.7	294.7	276.4
Last Yr.	285.8	69.8	25.0	329.9	247.6
2 Yrs. Ago	272.9	67.3	19.9	399.5	248.2
3 Yrs. Ago	264.2	61.2	16.8	351.9	237.4
4 Yrs. Ago	247.7	59.7	19.5	332.2	238.8

Growth Over Last 5 Years (%)

	Net Sales	Operating Income	Net Income
Median	5.15	3.43	5.39
SIC Composite	4.81	4.72	9.79
Large Composite	8.16	5.06	6.29
Small Composite	9.44	4.54	16.64

Capital Structure Ratios (%)

	Debt/Total Capital		Debt/MV Equity	
	Latest	5-Year Avg	Latest	5-Year Avg
Median	51.14	49.23	104.68	97.01
SIC Composite	48.40	42.43	93.80	73.71
Large Composite	41.04	34.81	69.61	53.39
Small Composite	45.91	40.92	84.86	69.25

Distribution of Sales & Total Capital (million$)

	Distribution of Sales		Total Capital	
	Latest	5-Year Avg	Latest	5-Year Avg
90th Percentile	14,534.0	13890.2	30673.5	29,699.7
75th Percentile	12,958.6	10415.4	19587.3	20,431.6
Median	3,538.6	3348.6	7312.4	7,299.5
25th Percentile	1,159.5	1088.4	2711.5	2,297.8
10th Percentile	353.6	286.9	496.4	385.3

Margins (%)

	Operating Margin		Net Margin		Asset Turnover		Return on Inv. Cap.		Return on Assets		Return on Equity	
	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg
Median	26.04	24.23	7.76	7.22	38.17	37.58	3.51	3.59	2.72	2.62	7.22	7.23
SIC Composite	23.46	23.95	6.75	7.40	41.36	40.13	3.73	4.02	2.79	2.97	7.01	6.02
Large Composite	24.15	24.38	7.04	8.66	46.03	42.95	4.49	5.18	3.24	3.72	5.98	5.54
Small Composite	15.09	16.35	5.51	4.27	53.94	53.73	3.74	3.22	2.97	2.30	6.02	4.69

Equity Valuation Ratios (Multiples)

	Price/Earnings		Market/Book		Price/Sales		Price/Cash Flow		Price/Operating Income	
	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg	Latest	5-Year Avg
Median	13.85	13.82	1.26	1.28	1.02	0.96	NMF	NMF	4.35	4.32
SIC Composite	14.26	16.39	1.06	1.32	0.96	1.23	NMF	81.60	4.10	5.14
Large Composite	16.74	20.08	1.58	1.87	1.18	1.56	NMF	167.15	4.88	6.42
Small Composite	16.61	13.61	1.31	1.31	0.91	0.91	28.79	30.86	6.06	5.57

Dividend Yield

	(% of Price)	
	Latest	5-Year Avg
Median	4.61	3.69
SIC Composite	4.76	3.58
Large Composite	4.76	3.55
Small Composite	3.43	2.49

Growth Rates (%)

	Analysts' Estimate
Median	5.83
SIC Composite	6.02
Large Composite	6.10
Small Composite	11.13

Cost of Equity Capital (%)

	CAPM	CAPM + Size Prem	3-Factor Fama-French	Discounted Cash Flow 1-Stage	Discounted Cash Flow 3-Stage
Median	8.12	8.78	7.75	10.88	9.50
SIC Composite	7.63	7.63	6.99	6.33	10.10
Large Composite	7.41	7.41	6.50	6.34	9.70
Small Composite	7.84	11.58	8.22	6.18	8.90

Weighted Average Cost of Capital (%)

	CAPM	CAPM + Size Prem	3-Factor Fama-French	Discounted Cash Flow 1-Stage	Discounted Cash Flow 3-Stage
Median	7.89	8.23	7.73	9.28	8.84
SIC Composite	7.67	7.67	7.33	6.98	9.00
Large Composite	7.46	7.46	6.91	6.82	8.85
Small Composite	8.73	11.02	8.97	7.72	9.38

Betas

	Levered Raw Beta	Levered Adjusted Beta	Unlevered Adjusted Beta
Median	0.63	0.63	0.29
SIC Composite	0.56	0.56	0.35
Large Composite	0.51	0.52	0.36
Small Composite	0.62	0.59	0.38

2009 Ibbotson® Cost of Capital Yearbook ©2009; Data through September 2009 **Morningstar, Inc.**

Source: Morningstar's Ibbotson 2009 Cost of Capital Yearbook

iii) Size premium (*s*)

The table below (Table 7-2 from page 90 on Morningstar's Ibbotson Stocks, Bonds, Bills and Inflation 2009 Valuation Yearbook) shows the largest company in each size-decile portfolio of the NYSE/AMEX/NASDAQ stock exchanges. Notice that a very large number of CDM projects falls within the smallest decile (number 10), as the value of the latter is less than 218 million[5].

Excerpt 3 - Company size in the main stock exchanges

Table 7-2: Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Largest Company and Its Market Capitalization by Decile

Decile	Recent Market Capitalization (in Thousands)	Company Name
1-Largest	465,651,938	Exxon Mobil Corp.
2	18,503,467	Waste Management Inc. Del
3	7,360,271	Reliant Energy Inc.
4	4,225,152	IMS Health Inc.
5	2,785,538	Family Dollar Stores Inc.
6	1,848,961	Bally Technologies Inc.
7	1,197,133	Temple Inland Inc.
8	753,448	Kronos Worldwide Inc.
9	453,254	SWS Group Inc.
10-Smallest	218,533	Beazer Homes USA Inc.

Source: Calculated (or Derived) based on data from CRSP US Stock Database and CRSP US Indices Database ©2009 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business. Used with permission.
Market capitalization and name of largest company in each decile as of September 30, 2008.

Source: Page 90 or Morningstar's Ibbotson Stocks, Bonds, Bills and Inflation 2009 Valuation Yearbook

Small-capitalization stocks are still considered riskier investments than large company stocks. Investors require an additional reward in the form of additional return, to take on the added risk of an investment in small-capitalization stock. Thus, a size premium for small-investment is added to the cost of equity determined by the Capital Asset Pricing Model (CAPM):

[5] Excerpt 4 below presents size premiums for bigger projects as well.

"*the capital asset pricing model (CAPM) does not fully account for the higher returns of small company stocks. Table 7-5 shows the returns in excess of systematic risk over the past 82 years for each decile of the NYSE/AMEX/NASDAQ (...) This return in excess of that predicted by CAPM increases as one moves from the largest companies in decile 1 to the smallest in decile 10. The excess return is especially pronounced for microcap stocks (deciles 9-10). This size-related phenomenon has prompted a revision to the CAPM, which includes a size premium*" (ibidem, page 94).

The Micro-capitalization size premium of 3.74% is exhibited in the lower right corner of Table 7-5, reproduced below.

Excerpt 4 - Size premium for different project sizes

Table 7-5: Size-Decile Portfolios of the NYSE/AMEX/NASDAQ Long-Term Returns in Excess of CAPM

Decile	Beta*	Arithmetic Mean Return (%)	Actual Return in Excess of Riskless Rate** (%)	CAPM Return in Excess of Riskless Rate† (%)	Size Premium (Return in Excess of CAPM) (%)
1-Largest	0.91	10.75	5.56	5.91	-0.36
2	1.03	12.51	7.31	6.69	0.62
3	1.10	13.06	7.87	7.13	0.74
4	1.12	13.45	8.25	7.28	0.97
5	1.16	14.23	9.03	7.49	1.54
6	1.18	14.48	9.28	7.65	1.63
7	1.24	14.84	9.65	8.03	1.62
8	1.30	15.95	10.76	8.41	2.35
9	1.35	16.62	11.42	8.71	2.71
10-Smallest	1.41	20.13	14.93	9.12	5.81
Mid-Cap, 3–5	1.12	13.37	8.18	7.24	0.94
Low-Cap, 6–8	1.22	14.86	9.66	7.92	1.74
Micro-Cap, 9–10	1.36	17.72	12.52	8.79	3.74

Data from 1926–2008.

*Betas are estimated from monthly returns in excess of the 30-day U.S. Treasury bill total return, January 1926–December 2008.

**Historical riskless rate measured by the 83-year arithmetic mean income return component of 20-year government bonds (5.20).

†Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (11.67 percent) minus the arithmetic mean income return component of 20-year government bonds (5.20 percent) from 1926–2008.

Source: Page 94 on Morningstar's Ibbotson Stocks, Bonds, Bills and Inflation 2009 Valuation Yearbook

Back to equation(0.1): conclusions, results and comparison

Using our previous results for our Nicaraguan example, we obtain the following values:

$r_f = r_{NI}^{30yr} = 0.1291$

$\beta_j\ (r_m - r_f) = 0.52 \text{ x } 0.0647 = 0.033644$

$s = 0.0374$

and thus:

$r_e = 0.1291 + 0.033644 + 0.0374 = 0.200144 \approx 20\%$

The purpose of this example is to point out the significant difference between the results yielded by this approach (which is based on tools commonly used on financial analysis) and the proposed default values. While our result is a 20% benchmark, the default value proposed on Appendix A of the investment guidance for the benchmark analysis of a project in the Republic of Nicaragua is 15.5%.

References

- UNFCCC Executive Board, 2010 - Draft revision to the GUIDELINES ON THE ASSESSMENT OF INVESTMENT ANALYSIS (Version 04; EB 58)
- Morningstar's Ibbotson, 2009: "*Stocks, Bonds, Bills and Inflation 2009 Valuation Yearbook*"
- Morningstar's Ibbotson, 2009: "2009 *Cost of Capital Yearbook"*
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