

**CDM-MP70-A17**

## Methodological tool

---

# Tool 27: Investment analysis

Version 07.0



**United Nations**  
Framework Convention on  
Climate Change

<b>TABLE OF CONTENTS</b>		<b>Page</b>
<b>1. INTRODUCTION .....</b>		<b>4</b>
1.1. Background .....		4
<b>2. SCOPE, APPLICABILITY, AND ENTRY INTO FORCE .....</b>		<b>4</b>
2.1. Scope and applicability .....		4
2.2. Entry into force .....		4
<b>3. DEFINITIONS .....</b>		<b>4</b>
<b>4. GENERAL ISSUES IN CALCULATION AND PRESENTATION .....</b>		<b>4</b>
<b>5. APPLICATION OF PROJECT IRR AND EQUITY IRR .....</b>		<b>6</b>
<b>6. SELECTION AND VALIDATION OF APPROPRIATE BENCHMARKS .....</b>		<b>6</b>
6.1. Cost of equity (expected return on equity) in the market.....		8
6.2. Cost of debt .....		9
6.3. Weighting of debt and equity .....		10
<b>7. SENSITIVITY ANALYSIS .....</b>		<b>11</b>
<b>APPENDIX. DEFAULT VALUES FOR COST OF EQUITY (THE EXPECTED RETURN ON EQUITY).....</b>		<b>12</b>

## COVER NOTE

### 1. Procedural background

1. The Board at its eighty-fifth meeting approved the revised methodological tool: "TOOL27: Investment analysis". In the same meeting, the Board also requested the Methodologies Panel to revise the methodological tool to identify the host countries where the cost of equity may be calculated using the capital asset pricing model (CAPM) (i.e. where the conditions proposed in section 6.1 of the revised methodological tool can be satisfied) and to recommend the revised methodological tool for the consideration of the Board at a future meeting.

### 2. Purpose

2. The purpose of the draft revision is to (1) identify host countries where the cost of equity may be calculated using the Capital Asset Pricing Model (CAPM), and (2) update the default values of the cost of equity for different countries.

### 3. Key issues and proposed solutions

3. No issues identified.

### 4. Impacts

4. The revision of the methodological tool, if approved, will simplify the procedure for the project proponent in applying the investment analysis.

### 5. Subsequent work and timelines

5. The Meth Panel, at its seventieth meeting, agreed on the draft revision of the methodological tool. After receiving public inputs on the document, the Meth Panel will continue working on the revision of the tool, at its next meeting, for recommendation to the Board at a future meeting of the Board.

### 6. Recommendations to the Board

6. Not applicable (call for public inputs).

## 1. Introduction

### 1.1. Background

1. In consideration of issues identified through request for reviews and reviews of requests for registration the CDM Executive Board (hereinafter referred to as the Board) considers it necessary to provide project participants and designated operational entities (DOEs) with requirements on the preparation, presentation and validation of investment analysis.

## 2. Scope, applicability, and entry into force

### 2.1. Scope and applicability

2. This methodological tool is applicable to project activities that apply the methodological tool “Tool for the demonstration and assessment of additionality”, the methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality”, the guidelines “Non-binding best practice examples to demonstrate additionality for SSC project activities”, or baseline and monitoring methodologies that use the investment analysis for the demonstration of additionality and/or the identification of the baseline scenario.
3. In case the applied approved baseline and monitoring methodology contains requirements for the investment analysis that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.

### 2.2. Entry into force

4. The date of entry into force is the date of the publication of the EB<sup>xx</sup> meeting report on <sup>xx xx</sup> 2016.

## 3. Definitions

5. The definitions contained in the Glossary of CDM terms shall apply.

## 4. General issues in calculation and presentation

6. The period of assessment should not be limited to the proposed crediting period of the CDM project activity. Both project IRR and equity IRR calculations should reflect the period of expected operation of the underlying project activity (technical lifetime and if a shorter period than the technical lifetime is chosen, the investment analysis shall be conducted for at least 10 years and include the fair value of the project activity assets at the end of the assessment period. The IRR calculation may include the cost of major maintenance and/or rehabilitation if these are expected to be incurred during the period of assessment.

**Rationale:** The purpose of undertaking an investment analysis is to determine whether or not the project activity would be financially viable without the incentive of the CDM. The actual project activity is not limited in time to the crediting period being requested.

7. The fair value of any project activity assets at the end of the assessment period shall be included as a cash inflow in the final year. The fair value should be calculated in

accordance with local accounting regulations where available, or international best practice. It is expected that such fair value calculations will include both the book value of the asset and the reasonable expectation of the potential profit or loss on the realization of the assets.

**Rationale:** Net Present Value (NPV) or Internal Rate of Return (IRR) calculations are designed to calculate the return on the cost of investment, in cases where the capital expenditures have not been fully devalued this should be reflected as a cash inflow. Not to apply a residual value would imply that the project must repay the full value of the capital expenditure before the value of this expenditure had been consumed.

8. The discount rate used in the investment comparison analysis shall be determined following the requirements as set out in this tool for the calculation of IRR benchmarks in section 6 below.
9. The weighted average costs of capital (WACC) and the cost of equity provided in the Appendix or calculated using Capital Asset Pricing Model (CAPM) are post-tax IRR benchmarks, and investment analysis shall be conducted with post-tax cash flows. Depreciation, and other non-cash items related to the project activity, which have been deducted in estimating gross profits on which tax is calculated, shall be added back to net profits for the purpose of calculating the financial indicator (e.g. IRR, NPV). The cash flow effects of taxation should be included in the IRR/NPV calculation.
10. **Rationale:** Depreciation is not an actual expense incurred by the company and as such does not directly affect the financial viability of the project. To treat both the capital cost of the assets and their depreciation as an expense to the project would be a double counting of this cost.
11. Input values used in all investment analysis shall be valid and applicable at the time of the investment decision taken by the project participant. The DOE is therefore expected to validate the timing of the investment decision and the consistency and appropriateness of the input values with this timing. The DOE should also validate that the listed input values have been consistently applied in all calculations.

**Rationale:** The use of investment analysis to demonstrate additionality is intended to assess whether or not a reasonable investor would or not decide to proceed with a particular project activity without the benefits of the CDM. This decision will therefore be based on the relevant information available at the time of the investment decision and not information available at an earlier or later point. Any expenditures occurred prior to the decision to proceed with the investment in the project will not impact the final investment decision as such expenses sunk costs which remain unaffected by the decision to proceed or not with a project activity.

12. In the case of project activities for which implementation ceases after the commencement and where implementation is recommenced due to consideration of the CDM the investment analysis should reflect the economic decision-making context at point of the decision to recommence the project. Therefore capital costs incurred prior to the revised project activity start date can be reflected as the recoverable value of the

assets, which are limited to the potential reuse/resale of tangible assets.<sup>1</sup>

**Rationale:** At the point of taking a decision to restart implementation of a project as a CDM project activity, the key issue of interest to an investor is the costs and revenues including the incentives from the CDM accruing from continuation of the investment.

13. Project participants shall supply spreadsheet versions of all investment analysis. All formulas used in this analysis shall be readable and all relevant cells shall be viewable and unprotected. The spreadsheet will be made available to the Board, UNFCCC secretariat and others contracted to assess the request for registration on behalf of the Board including assigned members of the Registration and Issuance Team. In cases where the project participant does not wish to make such a spreadsheet available to the public an exact read-only or PDF copy shall be provided for general publication. In case the project participant wishes to black-out certain elements of the publicly available version, a clear justification for this shall be provided to the secretariat by the DOE when requesting registration.

**Rationale:** Investment analysis shall be presented in a transparent manner, to the extent that the reader can reproduce the results.

## 5. Application of Project IRR and Equity IRR

14. The cost of financing expenditures (i.e. loan repayments and interest) shall not be included in the calculation of project IRR.

**Rationale:** The purpose of the project IRR calculation is to determine the viability of the project to service debt. Therefore to include the cost of financing as an expense in this calculation would result in a double counting of this cost in the ultimate analysis.

15. In the calculation of equity IRR only the portion of investment costs which is financed by equity should be considered as the net cash outflow, the portion of the investment costs which is financed by debt should not be considered a cash outflow.

**Rationale:** The purpose of the equity IRR calculation is to determine the final return on the initial equity investment. In such calculations cost of servicing debt (interest and principle payments) are considered as costs. Therefore to consider all investment costs to be a cash outflow would double count the cost of debt to the equity investor.

## 6. Selection and Validation of Appropriate Benchmarks

16. The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate. The DOE shall validate that the benchmarks used are applicable to the project activity and the type of IRR calculation presented.

---

<sup>1</sup> Capital expenditures should be included not at the original investment costs but at the market fair value at the point of the decision to proceed with the investment, demonstrating the value through assessments done by chartered specialists.

$$WACC = r_e \times W_e + r_d \times W_d \times (1 - T_c) \quad \text{Equation (1)}$$

Where:

$r_e$	=	Cost of equity (-)
$W_e$	=	Percentage of financing that is equity (-)
$r_d$	=	Cost of debt (-)
$W_d$	=	Percentage of financing that is debt (-)
$T_c$	=	Corporate tax rate (-)

**Rationale:** For the same project activity the project IRR and equity IRR will be different, therefore the benchmark shall be appropriate to the type of calculation applied.

17. In situations where an investment analysis is carried out in nominal terms and the available IRR benchmarks are in real terms, project participants shall convert the real term values of benchmarks to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used.
18. In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market. The DOE's validation of the benchmark shall also include its opinion on whether a company-specific benchmark or a benchmark based on parameters that are standard in the market is suitable in the context of the underlying project activity.

**Rationale:** If the project could be developed by a different entity the unwillingness of one investor to assume the associated risks is not sufficient evidence that the project is additional, as this may be based on the subjective profit expectations of that investor. The applied benchmark must be suitable for the specific proposed project activity. It is not suitable to compare the return of low risk investments with the returns achieved or achievable by higher risk investments.

19. If there is only one possible project developer, either internal company benchmarks/expected returns may be applied, or the benchmark based on standard conditions in the market may be used. If internal company benchmarks/expected returns are used, it should be demonstrated to have been used for similar projects with similar risks, developed by the same company or, if the company is brand new, would have been used for similar projects in the same sector in the country/region. This shall require as a minimum clear evidence of the resolution by the company's Board and/or shareholders and require the validating DOE to undertake a thorough assessment of the financial statements of the project developer to assess the past financial behaviour of the entity during at least the last 3 years in relation to similar projects.

**Rationale:** The Tool for the demonstration and assessment of additionality (version 7) requires that benchmarks should not include the subjective profitability expectations or risk profile of a particular project developer. Note that a company's internal benchmark

can be derived in different ways, however, values derived based on such approaches should only be used if the resulting benchmarks were consistently used by the company in the past.

### 6.1. Cost of equity (expected return on equity) in the market

20. If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in the Appendix; or by (b) calculating the cost of equity using CAPM.<sup>2</sup> The default values in the Appendix are based on long term historical returns and therefore may also be applied by projects with a start date prior to the adoption of the default values by the Board.

**Rationale:** The values in the Appendix reflect, as an approximate value, the returns on equity expected by the market for different sectors and countries. The expectation of return depends on conditions of the market that can be modelled, taking into account the history (time series) of the market key variables (explaining variables proper of the technology and/or sector under analysis).

21. The cost of equity may be calculated using CAPM if all of the following conditions are satisfied, according to the most recent datasets from the World Federation of Exchanges<sup>3</sup> and the Gross Domestic Product (GDP) from the World Bank or UNSTAT.<sup>4</sup> In addition, the countries meeting the criteria (a)-(c) and (e) are indicated in the Table 1 in the Appendix.

- (a) More than 10 years of existence for the stock exchange;
- (b) The stock market is representative of the domestic economy, i.e. ratio of stock market capitalization to GDP is in excess of 20 per cent;
- (c) The average share turnover ratio over the last calendar year is in excess of 20 per cent;
- (d) There is at least three domestic pure players that belong to the same sector as the project<sup>5</sup> to calculate beta with at least 3 years of daily stock market data, and daily values are available;
- (e) There are domestic government securities labelled in the domestic currency with maturities over 10 years.

**Rationale** for the individual conditions above:

- (a) For market return, it allows to include relatively recent but quite active stock exchanges;

---

<sup>2</sup> Adjustment to the CAPM or use of other financial models may be proposed through a request of revision of the Tool for the demonstration and assessment of additionality.

<sup>3</sup> <<http://www.world-exchanges.org/statistics>>.

<sup>4</sup> <<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>>; <<http://unstats.un.org/unsd/databases.htm>>.

<sup>5</sup> If this data requirement cannot be met, the sector may be defined more broadly, e.g. by extending from the solar PV sector to the renewable energy sector and even to the utilities sector, so that at least three players can be identified.

- (b) For market return, this level is relatively low on purpose to ensure that countries that haven't been undergoing multiple waves of privatization but still offer domestic private sector investment opportunities be included;
- (c) For market turnover, a ratio in excess of 100 per cent means that a single stock is traded more than once per year / a ratio of 20 per cent means that, on average, one stock out of five changes hands every year;
- (d) Minimum information required to calculate beta;
- (e) For risk free rate, the maturity of such security should not be significantly lower than the project lifetime.

22. The application of CAPM to calculate the cost of equity shall follow the equation below, and should use official data sources from financial institutions (central banks, stock exchanges, etc.) as preferred choice over third party sources:

$$r_e = r_f + \beta \times (r_m - r_f) \quad \text{Equation (2)}$$

Where:

- $r_e$  = Cost of equity (-)
- $r_f$  = Risk-free rate (-). It shall be based on local sovereign debt and shall have a maturity date close to the project lifetime (at least 10 years) and sufficient liquidity. The latest (rather than the average over a time horizon) sovereign debt data available at the time of the investment decision should be used
- $\beta$  = Beta (-). The beta shall be calculated as the weighted arithmetic average of the beta of all the pure players that have been in business for at least 3 years and over the longest common lifetime for the companies in the sample of pure players, weighted by the total capitals (i.e. equity and long-term debt) of the pure players. Every pure player that meets the abovementioned criteria and that belongs to the same sector as defined in the previous paragraph shall be accounted for and used in the beta calculation. The individual betas shall be calculated independently without deleveraging by the debt-equity ratios of the pure players
- $r_m$  = Expected market return. It shall be calculated using the average of the following three annualized rates of return of stock market for (1) the longest time series available, (2) a 20-year horizon (if existing), and (3) a 10-year horizon (if existing). Daily values shall be used. Should there be multiple stock exchange indices, stock issues for a given company, or sovereign debt issues, the most liquid or most frequently traded one shall be used. For stock market indices, liquidity is assessed with the volume of trading for the component stock issues

## 6.2. Cost of debt

23. If a company's internal benchmark is used for the expected return on equity, the cost of debt should be based on the weighted average cost of debt financing of the legal entity owning the CDM project activity:

- (a) For loans, use the weighted average cost of outstanding long-term debt;

- (b) For bonds, use the weighted average yield of the bonds during the last three months prior to the submission of the CDM-PDD for validation or prior to the investment decision, whichever is earlier. The use of bonds to determine the cost of debt is only appropriate for corporate bonds issued in the host country of the CDM project;
  - (c) In cases where the debt finance structure of the project is not yet available (e.g. a letter of intent for debt funding is not available), the cost of debt can be assumed as the commercial lending rate in the country or the yield of a 10 year bond issued by the government of the host country or, if this is not available, the bond with the maturity which is closest to 10 years.
24. The following should be documented in the CDM-PDD:
- (a) For bonds: the key parameters of the bond including the time of maturity, yield, registration issuance in the financial system and set-up in the market;
  - (b) For loans from a financial institution: the contract of lending between the financial institution and the legal entity owning the assets of the project activity, or, in absence of the contract, a letter from the bank stating its intention to award the loan and the key terms for the loan;
  - (c) For debt financing from a parent company: the transfer of capital to the legal entity, documented with the contract of lending between the parent company and the legal entity owning the assets of the project activity and/or the parameters of the corporate bonds as mentioned above. This latter option is only valid for corporate bonds issued in the host country of the CDM project activity.

**Rationale:** Interest rates charged on loans are dependent upon a company's specific credit rating. Hence company specific interest rates are only relevant for projects with only one possible project developer.

25. If the benchmark is based on parameters that are standard in the market, the cost of debt should be calculated as the cost of financing in the capital markets (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on documented evidence from financial institutions with regard to the cost of debt financing of comparable projects. In cases where such data is not available, use the commercial lending rate in the host country to calculate the cost of debt.

### 6.3. Weighting of debt and equity

26. If a company's internal benchmark is used for the expected return on equity, then the percentage of debt financing and equity financing should reflect the long-term debt/equity finance structure of the legal entity owning the assets of the project activity. The percentage should be determined based on the latest balance sheet provided under local fiscal/accounting standards and rules if: (a) the legal entity owning the assets of the project activity has balance sheets audited by a third party within two years prior to the submission of the CDM-PDD for validation; and (b) the accounting books of the legal entity reflect at least the total value of all the assets needed for the project activity. If the debt/equity finance structure is not yet available, 50 per cent debt and 50 per cent equity financing may be assumed as a default.
27. If the benchmark is based on parameters that are standard in the market, then the typical debt/equity finance structure observed in the sector of the country should be

used. If such information is not readily available, 50 per cent debt and 50 per cent equity financing may be assumed as a default.

## 7. Sensitivity analysis

28. Variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Where a DOE considers that a variable which constitute less than 20 per cent has a material impact on the analysis they shall raise a corrective action request to include this variable in the sensitivity analysis.

**Rationale:** The initial objective of a sensitivity analysis is to determine in which scenarios the project activity would pass the benchmark or become more favourable than the alternative.

29. The DOE should assess in detail whether the range of variations is reasonable in the project context. Past trends may be a guide to determine the reasonable range. As a general point of departure variations in the sensitivity analysis should at least cover a range of +10 per cent and –10 per cent, unless this is not deemed appropriate in the context of the specific project circumstances. In cases where a scenario will result in the project activity passing the benchmark or becoming the most financially attractive alternative the DOE shall provide an assessment of the probability of the occurrence of this scenario in comparison to the likelihood of the assumptions in the presented investment analysis, taking into consideration correlations between the variables as well as the specific socio-economic and policy context of the project activity.

**Rationale:** The ultimate objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to provide a cross-check on the suitability of the assumptions used in the development of the investment analysis.

## Appendix. Default values for cost of equity (the expected return on equity)

1. The table below provides default values for the approximate expected return on equity for different project types and host countries. The expected return on equity is composed of four elements: (a) a risk free rate of return; (b) an equity risk premium; (c) a risk premium for the host country; and (d) an adjustment factor to reflect the risk of projects in different sectoral scopes. All values are expressed in real terms. Geometric means are used because they are more appropriate in corporate finance and valuations than the arithmetic means.<sup>1</sup>
2. The risk free rate of return is calculated based on the long-term average returns of US treasury bonds. The US stock market is used as a proxy because it has the longest well recorded data for government bonds as well as stocks. A value of 3.4 3.3 per cent is used.<sup>2</sup>
3. The equity risk premium is derived from the long-term historical returns on equity in the US market relative to the return of bonds. A value of 4.4 4.3 per cent is used.<sup>3</sup>
4. The risk premium for the host country is estimated using Moody's rating for the host country as a proxy for this risk<sup>4</sup>. For those countries for which ratings by Moody's are not available, the risk premiums were derived using Predictive Mean Matching method with macroeconomic data from the World Bank related to Economy & Growth, External Debt, Trade, Health and Environment.
5. For the purpose of determining the adjustment factor to reflect the risk of projects in different sectoral scopes, three different project categories are distinguished according to the sectoral scopes used under the CDM:
  - (a) Group 1 (Adjustment factor: no adjustment is made for this Group):
    1. Energy Industries;
    2. Energy Distribution;

---

<sup>1</sup> Equity Risk Premiums (ERP): Determinants, Estimation and Implications, the 2013 Edition; Aswath Damodaran; Stern School of Business (page 27).

<sup>2</sup> Based on the annualized real return on US government bonds for 1965-2014 2015. Source: Credit Suisse Global Investment Returns Yearbook 2015 2016 (Page 58 60), downloaded from <<https://www.credit-suisse.com/ch/en/news-and-expertise/research/credit-suisse-research-institute/publications.html>>.

<sup>3</sup> Based on the annualized real return on US government bonds for 1965-2014 2015. Source: Credit Suisse Global Investment Returns Yearbook 2015 2016 (Page 58 60), downloaded from <<https://www.credit-suisse.com/ch/en/news-and-expertise/research/credit-suisse-research-institute/publications.html>>.

<sup>4</sup> Downloaded on 18 March 2015 11 February 2016 from [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ctryprem](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem) <[http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ctryprem.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html)>.

3. Energy Demand;
  13. Waste handling and disposal.
- (b) Group 2 (Adjustment factor: the cost of equity is increased by 1 percentage point for this Group):
4. Manufacturing industries;
  5. Chemical Industries;
  6. Construction;
  7. Transport;
  8. Mining/Mineral production;
  9. Metal production;
  10. Fugitive Emissions from fuels;
  11. Fugitive Emissions from production and consumption of halocarbon, and Sulphur hexafluoride;
  12. Solvent use;
  16. Carbon capture and storage of CO<sub>2</sub> in geological formations.
- (c) Group 3 (Adjustment factor: the cost of equity is reduced by 0.5 percentage point for this Group):
14. Afforestation and reforestation;
  15. Agriculture.
6. Depending on the country and sector, project participants can select the relevant benchmark value for their proposed CDM project activity. Note that the values are expressed in percentages in real terms.

**Table 1. Default values for the cost of equity (expected return on equity)**

Country	Group 1	Group 2	Group 3	Meeting criteria (a)-(c) and (e) in paragraph 21?
Afghanistan	14.55	15.55	14.05	
Albania	14.55	15.55	14.05	
Algeria	14.55	15.55	14.05	
Andorra	11.00	12.00	10.50	
Angola	12.24	13.24	11.74	
Antigua and Barbuda	14.55	15.55	14.05	
Argentina	18.52	19.52	18.02	
Armenia	13.16	14.16	12.66	
Azerbaijan	11.00	12.00	10.50	
Bahamas	10.54	11.54	10.04	

Country	Group 1	Group 2	Group 3	Meeting criteria (a)-(c) and (e) in paragraph 21?
Bahrain	11.00	12.00	10.50	
Bangladesh	13.16	14.16	12.66	
Belize	21.51	22.51	21.01	
Benin	18.52	19.52	18.02	
Bhutan	17.65	18.65	17.15	
Bolivia	13.16	14.16	12.66	
Bosnia and Herzegovina	17.65	18.65	17.15	
Botswana	8.91	9.91	8.41	
Brazil	11.00	12.00	10.50	Y
Brunei Darussalam	10.07	11.07	9.57	
Burkina Faso	17.65	18.65	17.15	
Burundi	14.55	15.55	14.05	
Côte d'Ivoire	13.16	14.16	12.66	
Cambodia	16.10	17.10	15.60	
Cameroon	16.10	17.10	15.60	
Cape Verde	16.10	17.10	15.60	
Central African Republic	17.65	18.65	17.15	
Chad	14.55	15.55	14.05	
Chile	8.53	9.53	8.03	
China	8.53	9.53	8.03	Y
Colombia	10.54	11.54	10.04	
Comoros	18.52	19.52	18.02	
Congo	13.16	14.16	12.66	
Cook Islands	14.55	15.55	14.05	
Costa Rica	11.46	12.46	10.96	
Cuba	21.51	22.51	21.01	
Democratic People's Republic of Korea	18.52	19.52	18.02	
Democratic Republic of the Congo	17.65	18.65	17.15	
Djibouti	13.16	14.16	12.66	
Dominican Republic	14.55	15.55	14.05	
Ecuador	17.65	18.65	17.15	
Egypt	17.65	18.65	17.15	
El Salvador	13.16	14.16	12.66	
Equatorial Guinea	13.16	14.16	12.66	
Eritrea	14.55	15.55	14.05	
Ethiopia	14.55	15.55	14.05	
Fiji	14.55	15.55	14.05	
Gabon	13.16	14.16	12.66	
Gambia	16.10	17.10	15.60	
Georgia	13.16	14.16	12.66	
Ghana	17.65	18.65	17.15	
Grenada	13.16	14.16	12.66	
Guatemala	11.46	12.46	10.96	

Country	Group 1	Group 2	Group 3	Meeting criteria (a)-(c) and (e) in paragraph 21?
Guinea	18.52	19.52	18.02	
Guinea-Bissau	14.55	15.55	14.05	
Guyana	14.55	15.55	14.05	
Haiti	18.52	19.52	18.02	
Honduras	17.65	18.65	17.15	
India	11.00	12.00	10.50	Y
Indonesia	11.00	12.00	10.50	Y
Iran (Islamic Republic of)	11.46	12.46	10.96	
Iraq	18.52	19.52	18.02	
Israel	8.69	9.69	8.19	Y
Jamaica	21.51	22.51	21.01	
Jordan	14.55	15.55	14.05	
Kazakhstan	10.54	11.54	10.04	
Kenya	14.55	15.55	14.05	
Kiribati	17.65	18.65	17.15	
Kuwait	8.37	9.37	7.87	
Kyrgyzstan	11.00	12.00	10.50	
Lao People's Democratic Republic	17.65	18.65	17.15	
Lebanon	16.10	17.10	15.60	
Lesotho	13.16	14.16	12.66	
Liberia	18.52	19.52	18.02	
Libya	18.52	19.52	18.02	
Madagascar	16.10	17.10	15.60	
Malawi	18.52	19.52	18.02	
Malaysia	9.45	10.45	8.95	Y
Maldives	16.10	17.10	15.60	
Mali	14.55	15.55	14.05	
Mauritania	17.65	18.65	17.15	
Mauritius	10.07	11.07	9.57	
Mexico	9.45	10.45	8.95	Y
Micronesia (Federated States of)	18.52	19.52	18.02	
Mongolia	16.10	17.10	15.60	
Montenegro	13.16	14.16	12.66	
Morocco	11.46	12.46	10.96	
Mozambique	16.10	17.10	15.60	
Myanmar	14.55	15.55	14.05	
Namibia	11.00	12.00	10.50	
Nepal	14.55	15.55	14.05	
Nicaragua	16.10	17.10	15.60	
Niger	18.52	19.52	18.02	
Nigeria	13.16	14.16	12.66	
Oman	8.69	9.69	8.19	
Pakistan	17.65	18.65	17.15	

Country	Group 1	Group 2	Group 3	Meeting criteria (a)-(c) and (e) in paragraph 21?
Panama	10.54	11.54	10.04	
Papua New Guinea	14.55	15.55	14.05	
Paraguay	11.46	12.46	10.96	
Peru	9.45	10.45	8.95	
Philippines	10.54	11.54	10.04	
Qatar	8.37	9.37	7.87	
Republic of Korea	8.37	9.37	7.87	Y
Republic of Moldova	17.65	18.65	17.15	
Republic of South Sudan	14.55	15.55	14.05	
Rwanda	14.55	15.55	14.05	
Saint Lucia	11.00	12.00	10.50	
Saint Vincent and the Grenadines	17.65	18.65	17.15	
Samoa	14.55	15.55	14.05	
San Marino	7.60	8.60	7.10	
Sao Tome and Principe	18.52	19.52	18.02	
Saudi Arabia	8.53	9.53	8.03	Y
Senegal	14.55	15.55	14.05	
Serbia	14.55	15.55	14.05	
Seychelles	9.45	10.45	8.95	
Sierra Leone	18.52	19.52	18.02	
Singapore	7.60	8.60	7.10	Y
Solomon Islands	14.55	15.55	14.05	
Somalia	21.51	22.51	21.01	
South Africa	10.54	11.54	10.04	Y
Sri Lanka	14.55	15.55	14.05	
Sudan	21.51	22.51	21.01	
Suriname	13.16	14.16	12.66	
Swaziland	18.52	19.52	18.02	
Syrian Arab Republic	23.04	24.04	22.54	
Tajikistan	16.10	17.10	15.60	
Thailand	10.07	11.07	9.57	Y
The former Yugoslav Republic of Macedonia	13.16	14.16	12.66	
Timor-Leste	14.55	15.55	14.05	
Togo	14.55	15.55	14.05	
Tonga	14.55	15.55	14.05	
Trinidad and Tobago	10.54	11.54	10.04	
Tunisia	13.16	14.16	12.66	
Turkmenistan	13.16	14.16	12.66	
Uganda	14.55	15.55	14.05	
United Arab Emirates	8.37	9.37	7.87	Y
United Republic of Tanzania	14.55	15.55	14.05	
Uruguay	10.54	11.54	10.04	
Uzbekistan	13.16	14.16	12.66	

Country	Group 1	Group 2	Group 3	Meeting criteria (a)-(c) and (e) in paragraph 21?
Vanuatu	18.52	19.52	18.02	
Venezuela	18.52	19.52	18.02	
Viet Nam	13.16	14.16	12.66	Y
Yemen	18.52	19.52	18.02	
Zambia	17.65	18.65	17.15	
Zimbabwe	18.52	19.52	18.02	

Table 2.

	Moody's Rating for Bonds	Group 1	Group 2	Group 3
Afghanistan	-	14.55	15.55	14.05
Albania	B1	14.55	15.55	14.05
Algeria	-	13.2	14.2	12.7
Andorra	Baa1	10.2	11.2	9.7
Angola	Ba2	12.3	13.3	11.8
Antigua and Barbuda	-	11.55	12.55	11.05
Argentina	Caa1	19.05	20.05	18.55
Armenia	Ba2	12.3	13.3	11.8
Azerbaijan	Baa3	11.1	12.1	10.6
Bahamas	Baa2	10.65	11.65	10.15
Bahrain	Baa2	10.65	11.65	10.15
Bangladesh	Ba3	13.2	14.2	12.7
Barbados	B3	17.55	18.55	17.05
Belize	Caa2	21.3	22.3	20.8
Benin	-	14.55	15.55	14.05
Bhutan	-	13.2	14.2	12.7
Bolivia	Ba3	13.2	14.2	12.7
Bosnia and Herzegovina	B3	17.55	18.55	17.05
Botswana	A2	9.08	10.08	8.58
Brazil	Baa2	10.65	11.65	10.15
Brunei Darussalam	-	8.7	9.7	8.2
Burkina Faso	B3	17.55	18.55	17.05
Burundi	-	14.55	15.55	14.05
Cambodia	B2	16.05	17.05	15.55
Cabo Verde	B2	16.05	17.05	15.55

	<b>Moody's Rating for Bonds</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Cameroon	B2	16.05	17.05	15.55
Central African Republic	-	16.05	17.05	15.55
Chad	-	16.05	17.05	15.55
Chile	Aa3	8.7	9.7	8.2
China	Aa3	8.7	9.7	8.2
Colombia	Baa2	10.65	11.65	10.15
Comoros	-	14.55	15.55	14.05
Congo	Ba3	13.2	14.2	12.7
Cook Islands	B1	14.55	15.55	14.05
Costa Rica	Ba1	11.55	12.55	11.05
Cuba	Caa2	21.3	22.3	20.8
Côte d'Ivoire	B1	14.55	15.55	14.05
Democratic People's Republic of Korea	-	14.55	15.55	14.05
Democratic Republic of the Congo	B3	17.55	18.55	17.05
Djibouti	-	14.55	15.55	14.05
Dominica	-	13.2	14.2	12.7
Dominican Republic	B1	14.55	15.55	14.05
Ecuador	B3	17.55	18.55	17.05
Egypt	Caa1	19.05	20.05	18.55
El Salvador	Ba3	13.2	14.2	12.7
Equatorial Guinea	-	10.65	11.65	10.15
Eritrea	-	16.05	17.05	15.55
Ethiopia	B1	14.55	15.55	14.05
Fiji	B1	14.55	15.55	14.05
Gabon	Ba3	13.2	14.2	12.7
Gambia	-	16.05	17.05	15.55
Georgia	Ba3	13.2	14.2	12.7
Ghana	B2	16.05	17.05	15.55
Grenada	-	13.2	14.2	12.7
Guatemala	Ba1	11.55	12.55	11.05
Guinea	-	16.05	17.05	15.55
Guinea-Bissau	-	17.55	18.55	17.05
Guyana	-	14.55	15.55	14.05
Haiti	-	14.55	15.55	14.05

	<b>Moody's Rating for Bonds</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Honduras	B3	17.55	18.55	17.05
India	Baa3	11.1	12.1	10.6
Indonesia	Baa3	11.1	12.1	10.6
Iran (Islamic Republic of)	-	13.2	14.2	12.7
Iraq	-	13.2	14.2	12.7
Israel	A1	8.85	9.85	8.35
Jamaica	Caa3	22.8	23.8	22.3
Jordan	B1	14.55	15.55	14.05
Kazakhstan	Baa2	10.65	11.65	10.15
Kenya	B1	14.55	15.55	14.05
Kiribati	-	14.55	15.55	14.05
Kuwait	Aa2	8.55	9.55	8.05
Kyrgyzstan	-	16.05	17.05	15.55
Lao People's Democratic Republic	-	14.55	15.55	14.05
Lebanon	B2	16.05	17.05	15.55
Lesotho	-	14.55	15.55	14.05
Liberia	-	14.55	15.55	14.05
Libya	-	9.08	10.08	8.58
Madagascar	-	16.05	17.05	15.55
Malawi	-	17.55	18.55	17.05
Malaysia	A3	9.6	10.6	9.1
Maldives	-	14.55	15.55	14.05
Mali	-	16.05	17.05	15.55
Marshall Islands	-	11.55	12.55	11.05
Mauritania	-	17.55	18.55	17.05
Mauritius	Baa1	10.2	11.2	9.7
Mexico	A3	9.6	10.6	9.1
Micronesia (Federated States of)	-	14.55	15.55	14.05
Mongolia	B2	16.05	17.05	15.55
Montenegro	Ba3	13.2	14.2	12.7
Morocco	Ba1	11.55	12.55	11.05
Mozambique	B1	14.55	15.55	14.05
Myanmar	-	17.55	18.55	17.05
Namibia	Baa3	11.1	12.1	10.6

	<b>Moody's Rating for Bonds</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Nepal	-	14.55	15.55	14.05
Nicaragua	B3	17.55	18.55	17.05
Niger	-	16.05	17.05	15.55
Nigeria	Ba3	13.2	14.2	12.7
Oman	A1	8.85	9.85	8.35
Pakistan	Caa1	19.05	20.05	18.55
Palau	-	19.05	20.05	18.55
Panama	Baa2	10.65	11.65	10.15
Papua New Guinea	B1	14.55	15.55	14.05
Paraguay	Ba2	12.3	13.3	11.8
Peru	A3	9.6	10.6	9.1
Philippines	Baa2	10.65	11.65	10.15
Qatar	Aa2	8.55	9.55	8.05
Republic of Korea	Aa3	8.7	9.7	8.2
Republic of Moldova	B3	17.55	18.55	17.05
Rwanda	B2	16.05	17.05	15.55
Saint Kitts and Nevis	-	14.55	15.55	14.05
Saint Lucia	-	10.65	11.65	10.15
Saint Vincent and the Grenadines	B3	17.55	18.55	17.05
Samoa	-	10.2	11.2	9.7
San Marino	-	7.8	8.8	7.3
Sao Tome and Principe	-	16.05	17.05	15.55
Saudi Arabia	Aa3	8.7	9.7	8.2
Senegal	B1	14.55	15.55	14.05
Serbia	B1	14.55	15.55	14.05
Seychelles	-	10.2	11.2	9.7
Sierra Leone	-	14.55	15.55	14.05
Singapore	Aaa	7.8	8.8	7.3
Solomon Islands	-	14.55	15.55	14.05
Somalia	-	11.55	12.55	11.05
South Africa	Baa2	10.65	11.65	10.15
South Sudan	-	17.55	18.55	17.05
Sri Lanka	B1	14.55	15.55	14.05
Sudan	-	14.55	15.55	14.05

	Moody's Rating for Bonds	Group 1	Group 2	Group 3
Suriname	Ba3	13.2	14.2	12.7
Swaziland	-	14.55	15.55	14.05
Syrian Arab Republic	-	16.05	17.05	15.55
Tajikistan	-	17.55	18.55	17.05
Thailand	Baa1	10.2	11.2	9.7
The former Yugoslav Republic of Macedonia	Ba3	13.2	14.2	12.7
Timor-Leste	-	13.2	14.2	12.7
Togo	-	14.55	15.55	14.05
Tonga	-	14.55	15.55	14.05
Trinidad and Tobago	Baa1	10.2	11.2	9.7
Tunisia	Ba3	13.2	14.2	12.7
Turkmenistan	-	14.55	15.55	14.05
Tuvalu	-	10.65	11.65	10.15
Uganda	B1	14.55	15.55	14.05
United Arab Emirates	Aa2	8.55	9.55	8.05
United Republic of Tanzania	-	17.55	18.55	17.05
Uruguay	Baa2	10.65	11.65	10.15
Uzbekistan	-	14.55	15.55	14.05
Vanuatu	-	16.05	17.05	15.55
Venezuela (Bolivarian Republic of)	Caa1	19.05	20.05	18.55
Viet Nam	B1	14.55	15.55	14.05
Yemen	-	14.55	15.55	14.05
Zambia	B1	14.55	15.55	14.05
Zimbabwe	-	16.05	17.05	15.55

-----

### Document information

Version	Date	Description
Draft 07.0	4 July 2016	MP 70, Annex 17 A call for public input will be issued for this draft revised methodological tool. Revision to update the default value of the cost of equity and to identify host countries where the cost of equity may be

<i>Version</i>	<i>Date</i>	<i>Description</i>
		calculated using the CAPM.
06.0	24 July 2015	EB 85, Annex 12 Revision to: <ul style="list-style-type: none"> <li>• Describe the conditions under which the application of capital asset pricing model (CAPM) can be considered appropriate;</li> <li>• Provide guidance on how CAPM should be applied to calculate the cost of equity;</li> <li>• Update the default values for the cost of equity in appendix;</li> <li>• Incorporate a clarification issued by the Board (EB73-A08-CLAR);</li> <li>• Include other editorial improvements;</li> <li>• Change the title to “Methodological tool: investment analysis”.</li> </ul>
05.0	15 July 2011	EB 62, Annex 5 The revision clarifies that: <ul style="list-style-type: none"> <li>• In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table in the appendix to nominal values by adding the inflation rate;</li> <li>• The default values for the expected return on equity showed in the table in the appendix are calculated after taxes.</li> </ul>
04.0	3 June 2011	EB 61, Annex 13 The revision provides further guidance on the calculation of the expected return on equity, the cost of debt and the percentage of equity and debt funding. The revision also includes a new Appendix with default values for the expected return on equity.
03.1	15 January 2010	EB 51, Annex 58 Editorial changes.
03.0	04 December 2009	EB 51, Annex 58 Revision to provide guidance on the treatment of interest payments in income tax calculations.
02.1	02 August 2008	EB 41, Annex 45 Revision to insert annex number.
02.0	02 August 2008	EB 41, Annex 45 Revision to provide guidance on the treatment of costs incurred prior to the project activity start date.
01.0	16 May 2008	EB 39, Annex 35 Initial adoption.

---

Decision Class: Regulatory  
 Document Type: Guideline  
 Business Function: Registration, Methodology

---

CDM-MP70-A17  
Methodological tool: Investment analysis  
Version 07.0

---

---

<i>Version</i>	<i>Date</i>	<i>Description</i>
----------------	-------------	--------------------

---

Keywords: barrier analysis, investment aspects

---