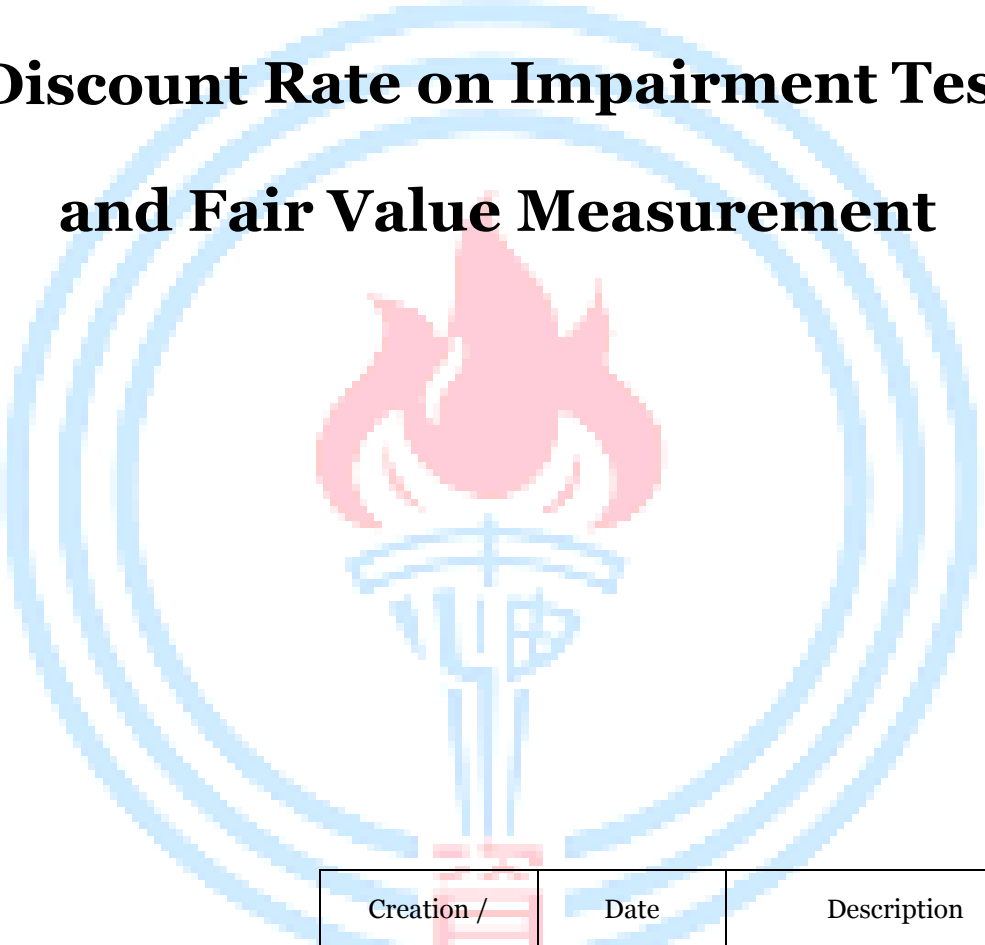# Discount Rate on Impairment Test

and Fair Value Measurement

Creation / Amendments	Date	Description
Creation	30/11/2018	Document creation

Purpose

The discount rate determination guideline and models will be applied on fair value measurement in Australia Ichthys liquefied pipeline company equity interest investment (downstream) and joint venture agreements on oil and gas in Australia, Ecuador, U.S., Chad and Niger.

Methodology

Capital Assets Pricing Model (CAPM)	
Introduction of Models	1. The required rate of return for equity interests comprises risk free rate and risk premium. 2. Risk premium is the multiple of systematic risk and market risk premium. 3. The present value of equity interests can be calculated by discounting the future cash flow with discount rate.
Model and Inputs	$E(Ri) = Rf + \beta[E(Rm) -Rf]$ ● E(Ri): the required rate of equity interests ● Rf: risk free rate ● β: Beta coefficient, systematic risk of equity interests ● [E(Rm) −Rf]: market risk premium
Weighted Average Cost of Capital (WACC)	
Introduction of Models	1. The cost of equity is the required rate of return for the investor when the investor bears the investment risk. 2. The cost of borrowing can be derived from

	the target company or market participant. The interest expense is tax-deductible expense. The effective borrowing rate need to be adjusted based on the tax effect. 3. When calculating the fair value of target company equity, it is required to discount the future cash flow with WACC and exclude the cash-related adjustments after evaluating the target company's capital structure.
Model and Inputs	$$\text{WACC} = \text{Kd}\frac{D}{(D+E)}(1-T) + Ke\frac{E}{(D+E)}$$ • Kd: cost of debt • D: debt ; $\frac{D}{(D+E)}$: debt ratio • T: income tax rate • Ke: cost of equity • E: equity ; $\frac{E}{(D+E)}$: equity ratio

Discount Rate Analysis

CAPM

A. Inputs Analysis (Country with Mature Capital Market)

1. Risk free rate (Rf): Long-term government bond. 10-year government bond yield of the country, region or country with a mature capital market is used as the parameter.

2. Systematic risk (β): $\beta_a = \frac{Cov(r_a, r_m)}{\sigma_m^2}$

   (1) Comparable companies based on business description and

the region of the target.

(2) 60 -120 period market data is used to calculate Beta coefficient in practice. Weekly market data for the past 2 years comprises 104 periods market data (52 weeks times 2 years); monthly market data for the past 5 years comprises 60 periods market data (12 months times 5 years). Calculate Beta coefficient using either the weekly market data for the past 2 years or monthly market data for the past 5 years.

(3) Calculate the covariance of comparable companies data and market data ($Cov(r_a, r_m)$) and divided by variance of market data (σ_m^2). The quotient is the levered Beta coefficient.

(4) Use Hamada equation to unlever the levered Beta coefficient.

- Hamada equation:$\beta_L = \beta_U[1 + (1 - \text{T})\left(\frac{D}{E}\right)]$

- $\beta_L LL$is the levered Beta coefficient. β_U is the unlevered Beta coefficient. T is the income tax rate. $\left(\frac{D}{E}\right)$ is the debt to equity ratio.

(5) Compared to mean, median can exclude the effect of outliers. Use median debt to equity ratio and income tax rate of comparable companies to relever the unlevered Beta coefficient.

3. Market risk premium and country risk premium: Data are quoted from Damodaran Online established by New York University professor Aswath Damodaran, who specializes in corporate finance and valuation (http://pages.stern.nyu.edu/~adamodar/). "Total Equity Risk Premium" of the target country in the "ERPs by country" tab quoted from Damodaran Online is applied as the market risk premium. Country risk premium is included in the market risk premium, so additional country risk premium adjustment is

not additionally considered.

4. Size premium: Based on empirical observation, the company size is negatively related to the business risk. The investor will ask for additional return when bearing higher risk. The Center for Research in Security Prices (CRSP) database summarizes the research data of relationship between company size and return. Search for the market capitalization interval that the target's asset size falls within, and the corresponding premium is applied as size premium.

B. Inputs Analysis (Country without Mature Capital Market)

1. Risk free rate (Rf): Since there is no mature capital market in the country where the target is located in, 10-year government bond yield from a mature capital market is applied as the parameter.

2. Systematic risk (β):

   (1) When there is a major consumption market of the target's product and the major consumption market is considered a mature capital market, the Beta coefficient of the major consumption market derived from industry peer group is applied.

   (2) If the major consumption market of the target's product is either unknown or considered as an immature capital market, or the target is not yet in production, the Beta coefficient of a country or region with a mature capital market is referred to evaluate the correlation between the target industry and economy.

   (3) The unlevered Beta coefficient from the country or region with a mature capital market in the same industry from "Levered and Unlevered Betas by Industry" file quoted from Damodaran Online is used for data source.

   (4) Use debt to equity ratio and income tax rate to relever the unlevered Beta coefficient.

3. Market risk premium and country risk premium: Data are quoted from Damodaran Online.

   (1) "Total Equity Risk Premium" of the target country, or

   (2) Global market risk premium could be applied as the target market risk premium to represent the correlation between the target industry and economy. The grand total of "Average of Equity Risk Premium" in the "Regional Simple Averages" tab quoted from Damodaran Online is applied as target market risk premium. Country risk premium is included in the market risk premium, so additional country risk premium adjustment is not additionally considered.

4. Size premium: Based on empirical observation, the company size is negatively related to the business risk. The investor will ask for additional return when bearing higher risk. The Center for Research in Security Prices (CRSP) database summarizes the research data of relationship between company size and return. Log on Duff & Phelps Cost of Capital Navigator and go to "CRSP Deciles Size Premium." Search for the market capitalization interval that the target's asset size falls within, and the corresponding premium is applied as size premium.

WACC

Inputs Analysis

1. Cost of debt: Adequate borrowing rate of the target

2. Income tax rate: Adequate incomes tax rate of the target company. The statutory income tax rate of the target country is usually applied.

3. Cost of equity: Derived from CAPM

4. Debt ratio and equity ratio: The median of comparable companies is applied.

Flowchart

Fair Value Measurement Discount Rate Flowchart
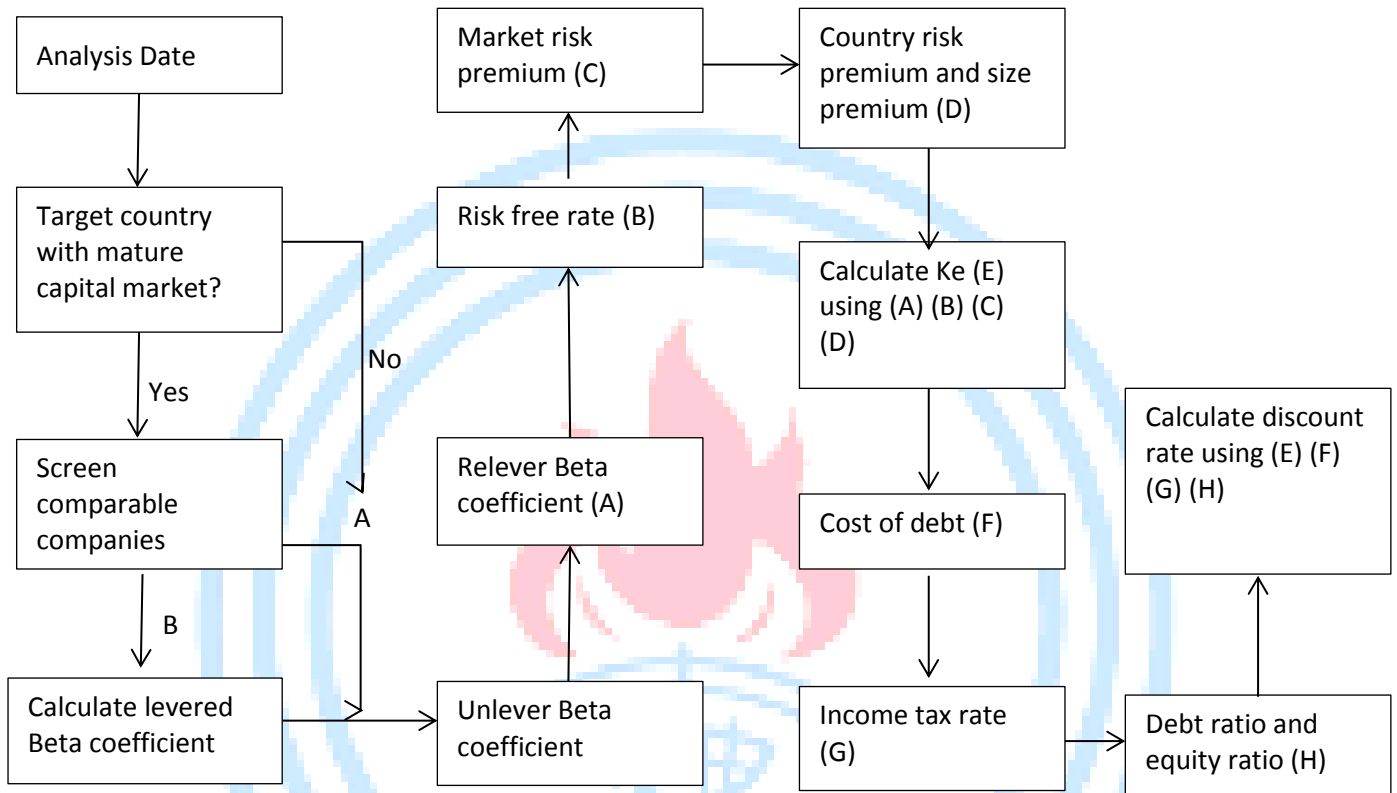
A. Target country does not have a mature capital market or the number of comparable company is massive even though the target country has a mature capital market. Use mature capital market parameter quoted from Damodaran Online.
B. The comparable companies are available.

Impairment Test Analysis Discount Rate

Flowchart

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┌─────────────────┐        ┌─────────────────┐   ┌──────────────────────┐
│ Analysis Date   │        │ Market risk     │   │ Country risk premium │
│                 │        │ premium (C)     │──▶│ and size premium (D) │
└────────┬────────┘        └────────▲────────┘   └──────────┬───────────┘
         │                          │                        │
         ▼                          │                        ▼
┌─────────────────┐        ┌─────────────────┐   ┌──────────────────────┐
│ Target country  │        │ Risk free rate  │   │ Calculate discount   │
│ with mature     │──No──┐ │ (B)             │   │ rate (E) using (A)(B)│
│ capital market? │      │ └────────▲────────┘   │ (C) (D)              │
└────────┬────────┘      │          │            └──────────────────────┘
         │ Yes           │          │
         ▼               │ A        │
┌─────────────────┐      │ ┌─────────────────┐
│ Screen          │      │ │ Relever Beta    │
│ comparable      │      │ │ coefficient (A) │
│ companies       │      │ └────────▲────────┘
└────────┬────────┘      │          │
         │ B             │          │
         ▼               ▼          │
┌─────────────────┐    ┌─────────────────┐
│ Calculate       │───▶│ Unlever Beta    │
│ levered Beta    │    │ coefficient     │
│ coefficient     │    │                 │
└─────────────────┘    └─────────────────┘
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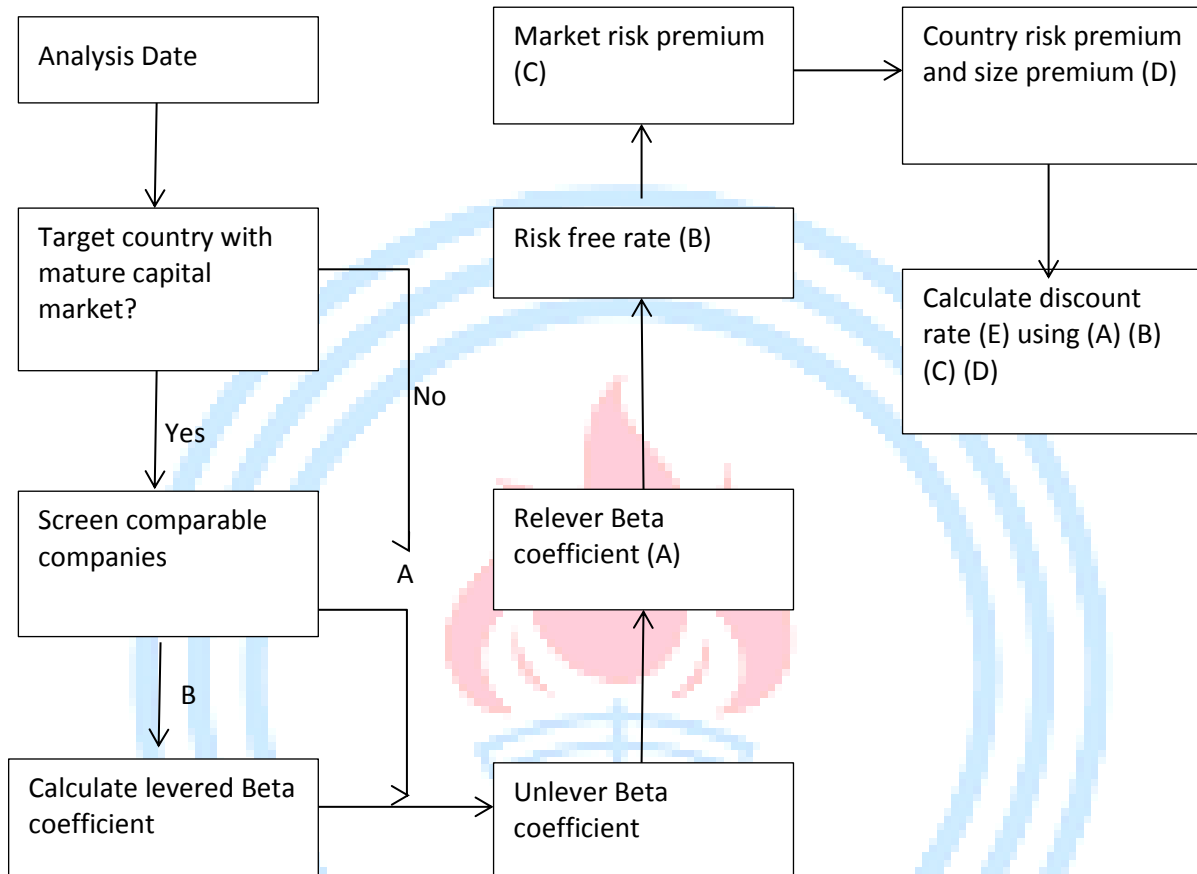
A.   Target country does not have a mature capital market or the number of comparable company is massive even though the target country has a mature capital market. Use mature capital market parameter quoted from Damodaran Online.

B.   The comparable companies are available.