# Practitioner’s guide to cost of capital & WACC calculation

EY Switzerland valuation best practice

February 2018

Building a better working world

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# EY Switzerland Valuation & Business Modeling (VBM) – Overview of team and solutions



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**A team of 25 VBM professionals in Zurich and Geneva**

## EY VBM solutions portfolio

### Valuation

- Transaction / business valuations
- Fairness / second opinions
- Tax valuations
- Arbitration / litigation valuations
- Start-up / venture valuations
- Purchase Price Allocations IFRS 3 / ASC 805
- Impairment Testing IAS 36 / ASC 350
- Share based payement valuations IFRS 2 / ASC 718

### Business modeling

- Integrated financial models
- Forecasting & planning
- Strategic option modeling
- Financing models
- Net working capital models
- Liquidity / cash flow modeling
- Carve-out models
- Standard models for regular use in reporting

### Analytics

- Descriptive / Diagnostic / Predictive / Prescriptive
- Deals analytics
- Workforce analytics
- Operational efficiency optimization
- Commercial analytics (e.g. pricing, promotion, products lunch, inventory)
- Network optimization
- R&D

# 1

# Introduction to cost of capital

# 1 Introduction to cost of capital

Key decision criterion in transactions, (regulatory) valuations and value based management



## Application in valuation

- Cost of capital has several applications
- Cost of capital is a key value driver in all valuations
- Cost of capital as a general term refers to the risk-adjusted cost rate that investors ask as return for their investment
- In entity based valuations (covering debt & equity, i.e. total invested capital / enterprise value), the most commonly used application is the weighted average cost of capital (WACC)
- The WACC is derived via the liability side using observable market data for cost of debt, cost of equity and capital structure

## Application areas

# 1 Introduction to cost of capital

Theory



## Cost of capital and risk

- Risk can either be accounted for in the cash flows or in the discount rate
- Consistency is key: only consider risks in cost of capital that are not reflected in cash flows and the other way round

| Items covered in cost of capital | Cost of equity | Cost of debt |
|---|---|---|
| ► Unsystematic risks are often reflected in the discount rate | Company specific risks / hurdle rate approach<br>Lack of marketability<br>Size premium | Company specific risks / hurdle rate approach |
| ► Systematic risk of the assets<br>► Financial leverage (gearing)<br>► Counterparty risk of debt | Equity risk premium (= market risk premium x beta) | Credit spread |
| ► Political risks<br>► Governmental risks (supply, demand, price risks etc.) | Country risk | Country risk |
| ► Time value of money<br>► Inflation<br>► Real growth | Base rate / risk free rate | |

# 1 Introduction to cost of capital
## WACC approach



### Basic formula

- The weighted average cost of capital (WACC) is determined by the cost of equity and debt, weighted by the market value of their share in total capital:

$$WACC = c_e \cdot \frac{E}{D+E} + c_d \cdot (1- t) \cdot \frac{D}{D+E}$$

Where

- $C_e$ = Cost of equity
- $C_d$ = Cost of debt
- D = Market value of debt
- E = Market value of equity
- t = Corporate income tax rate

### EY Switzerland best practice

- We apply the capital asset pricing model (CAPM) incl. a size premium to determine the cost of equity
- We determine the cost of debt by adding a credit spread according to a corporate bond reference index with adequate geographic focus and a respective rating to the base rate
- We determine the target capital structure based on the median capital structure of a meaningful peer group of at least five listed companies (incl. the target company, if listed), based on market values

**Illustrative example for earth moving equipment (small company, CHF based)**

| Weighted average cost of capital | | | Comments (source) |
|---|---|---|---|
| Base rate / "risk free" rate | 0.22% | a | Implied yield on 10-year government bond of Switzerland in local currency, 5 years historic average (Capital IQ) |
| Market risk premium | 6.00% | b | Global market risk premium (market studies) |
| Adjusted unlevered beta | 0.847x | c | Derived from peer group median value (Capital IQ), adjustment according to Blume |
| Adjusted relevered beta | 1.038x | d | According to Practitioners' Method: Beta (relevered) = beta (unlevered) * (1 + D/E) |
| Size premium | 3.67% | e | Size premium for Micro-cap (Duff & Phelps, Valuation Handbook 2017) |
| **Cost of equity** | **10.11%** | **g** | **= a + b x d + e + f** |
| Base rate / "risk free" rate | 0.22% | h | Implied yield on 10-year government bond of Switzerland in local currency, 5 years historic average (Capital IQ) |
| Credit spread | 1.10% | i | Credit Spread from Barclays Europe Aggregate Index - BBB |
| **Cost of debt** | **1.32%** | **k** | **= h + i + j** |
| Equity ratio | 81.61% | l | Capital structure derived from peer group median value (Capital IQ) |
| Debt ratio | 18.39% | m | Capital structure derived from peer group median value (Capital IQ) |
| Corporate income tax rate | 20.00% | n | Corporate income tax rate (EY Worldwide Corporate Tax Guide) |
| **WACC (rounded)** | **8.5%** | | **= g x l + k x m x (1 - n)** |

Source: see comments
Valuation date: 31 December 2017

# 2

## Cost of equity

# 2 Cost of equity
## Overview



### Basic formula

- Application of the capital asset pricing model (CAPM) to determine the cost of equity:

$$c_e = r_f + \beta \times MRP$$

Where

- $c_e$ = Cost of equity
- $r_f$ = Risk free rate
- $\beta$ = Beta (correlation measure of equity with market returns)
- MRP = Market risk premium (expected market return less risk free rate)

### EY Switzerland best practice

- We apply the capital asset pricing model (CAPM) to determine the cost of equity
- We extend the basic CAPM formula with the size premium, if advisable

| Weighted average cost of capital | | | Comments (source) |
|---|---|---|---|
| Base rate / "risk free" rate | 0.22% | a | Implied yield on 10-year government bond of Switzerland in local currency, 5 years historic average (Capital IQ) |
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| Debt ratio | 18.39% | m | Capital structure derived from peer group median value (Capital IQ) |
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| **WACC (rounded)** | **8.5%** | | **= g x l + k x m x (1 - n)** |

Source: see comments
Valuation date: 31 December 2017

# 2 Cost of equity
## Risk free rate / base rate



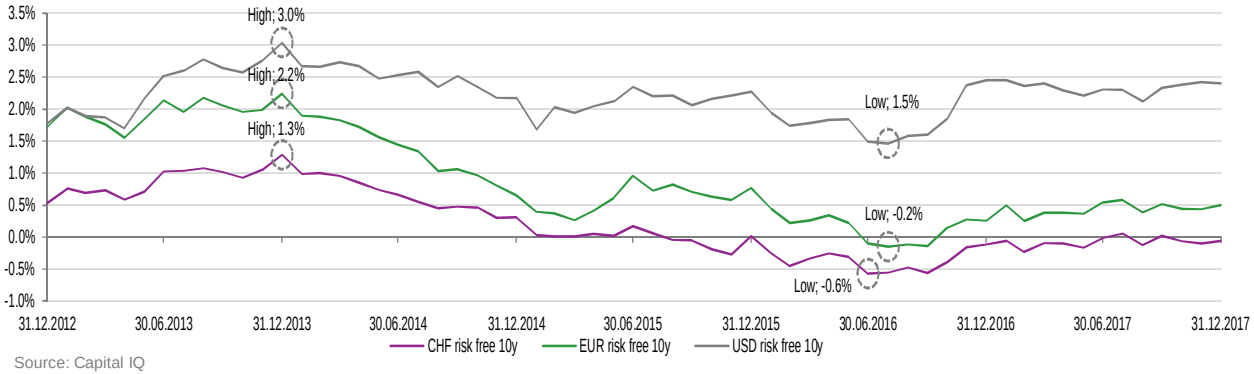
### Key points to consider

- In theory, the risk free rate represents the return an investor expects from an "absolutely" risk free investment over a specified period of time (i.e. the time value of money)
- In reality, there is no "real" risk free asset and hence no "pure" risk free rate exists. Therefore, we often refer to the "base rate" as some other items are covered in the rate we use as the base rate, i.e. time value of money, inflation (consistent with cash flows), certain real growth (of economy) and country risk (as reflected in the counterparty risk)

### EY Switzerland best practice

- 10-year generic government bond in local currency from Capital IQ / Bloomberg / Reuters / www.investing.com etc.
- Choice of the 10-year bond due to consistent availability for most countries / currencies and market liquidity, even though for USA and Switzerland also 20 or 30 year generic government bonds exist
- Use of the monthly 5-year historical average of yields of respective government bond to smoothen historical volatility and the currently extremely low interest rate environment
- Alternative approach: If no local government bond is available use CHF/USD/EUR bond + inflation differential for a given currency

**Implied yield to maturity on a 10-year government bond in local currency**




Source: Capital IQ
Valuation date: 31 December 2017

Assumption, that country risk is generally reflected in local government bond rate; however, in case of excessive counter party risk (e.g. for Greece / Italy / Argentina / Spain during debt crisis) the local government bond rate might overestimate the country risk and a separate assessment is necessary.

# 2 Cost of equity
## Market risk premium



### Basic formula

- The MRP is the extra return that is required by investors for shifting their money from a risk free investment to a diversified equity portfolio
- The unsystematic risk of a single investment is eliminated
- The MRP can be derived with historical or prospective models
- Implied (forward-looking) MRP are based on dividend discount models, calculating the expected market return by comparing the index value with the estimated dividend streams (analyst estimates)
- Implied MRP are available e.g. on Bloomberg

$$MRP = (\text{expected market return} - r_f)$$

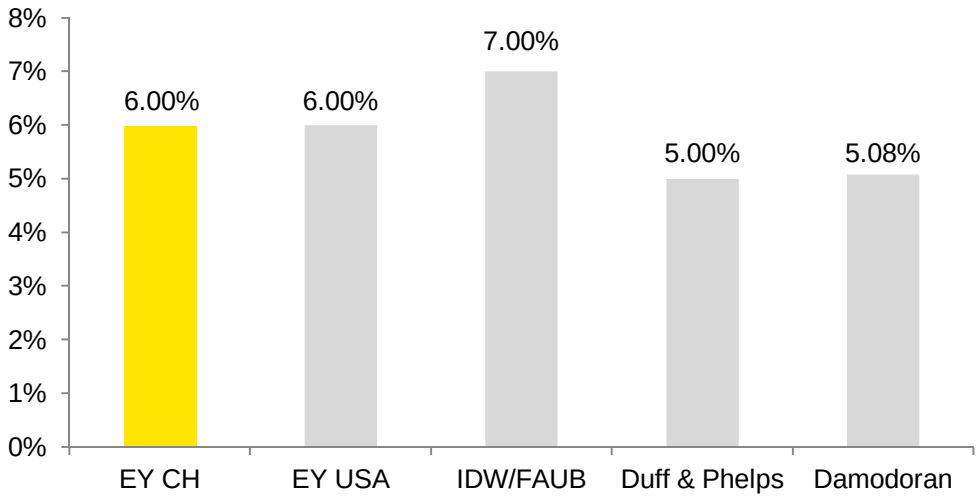
Where

- MRP = Market risk premium
- $r_f$ = Risk free rate

### EY Switzerland best practice

- EY Switzerland assumes a "historical" MRP of 6% along with the use of a 5-year historical average of the respective risk free rate
- The MRP is based on own research on the Swiss stock market but also considers international developments and consensus estimates

**Market risk premiums**




Notes to the graph

- IDW suggests a range between 5.5-7%
- Duff & Phelps only use the 5% in combination with a floored base rate of 4% in USD

# 2 Cost of equity
## Beta calculations



### Basic formula

- The beta is a correlation measure of equity returns with market returns. The beta represents the systematic risk of a security or a portfolio in comparison to the market as a whole
- Historical beta is usually determined applying OLS regression

$$b = \frac{Cov(R_Z, R_M)}{Var(R_M)}$$

Where

- Rz = Ln-returns of equity of valuation target
- $R_M$ = Ln-returns of the market

### Historical beta versus future beta

- The CAPM theory is based on market participant's expectations of the future
- Therefore, in theory, future betas should be used

### Company beta versus peer group beta

- If a valuation target is quoted on a stock exchange, one could take the company's beta instead of a peer group

### Appropriate reference index

- CAPM is based on an "all-comprising" market index, but such an index does not exist in practice
- National versus supranational index (e.g. MSCI World)
- Performance versus price index
- Currency of the index versus currency of the stock

### EY Switzerland best practice

- Since no standardized and widely accepted sources exist for future betas, we rely on historical betas
- N.B. Barra Beta as one source for future betas

### EY Switzerland best practice

- For fair market valuations, we usually rely on an unlevered peer group beta as this is required by IFRS / US GAAP
- Sometimes we rely on the company beta, if observable and statistically significant

### EY Switzerland best practice

- Use the broadest local index of a stock exchange where a company is listed (to avoid currency conversion)
- Use MSCI World (attention: adjust for FX effects) as a comparison
- Use price return indices instead of performance indices to avoid dividend correction

# 2 Cost of equity
## Beta calculations



### Appropriate time horizon

- Depending on the time horizon and periodicity of beta estimation, the beta might vary significantly
- 5 years monthly / 2 years weekly / daily price observations

### EY Switzerland best practice

- We apply 5 years monthly data (i.e. 60 observations)
- Monthly to exclude positive and negative market exaggerations

### Raw beta versus adjusted beta

- The raw beta is the beta based on an OLS regression
- The adjusted beta is an average (2/3 raw beta + 1/3 times the market beta of 1) accounting for mean reversion. This is known as Blume adjustment

### EY Switzerland best practice

- For industrial companies, we suggest to take the adjusted beta, since mean reversion seems to be an observable phenomenon
- For financial services companies like banks we suggest to use the levered raw equity beta

### Un- and relevering formulas

- Based on the implied assumption on the sustainability of cash flows and tax shields as well as a relatively or absolutely constant capital structure, there are different possibilities of un- and relevering

### EY Switzerland best practice

- Due to practicality, we apply the Practitioner's method, assuming a relatively constant capital structure and a debt beta of 0
- Unlevered beta = beta levered x ( 1 + D / E )

# 2 Cost of equity
## Beta calculations



1. Identification / selection of comparable companies (long list, short list)
   - ▸ Industry / sector
   - ▸ Size
   - ▸ Profitability / growth
   - ▸ Markets / segments
   - ▸ Risk profiles

2. Collection / analysis of historical and prospective financial information of peers, which serve as a basis for the determination of the capital structure

3. Determination of the raw beta by the use of regression techniques

   Based on empirical analysis, betas tend to 1 over time, therefore the betas are often adjusted according to Blume (see formula)

$$Adjusted\ beta = \frac{2}{3} * unadjusted\ beta\ (raw) + \frac{1}{3} * 1$$

4. Due to a lack of comparability of the equity betas because of the different capital structures of the peers, the respective equity betas get transformed by unlevering, i.e. neutralizing the individual capital structure, in order to get the unlevered beta (beta if the assets are fully equity financed)

1 2 4 3

| Companies | Ticker | Country | Currency | Filing date | Market cap in CHF | Minority interests | Total debt | Debt / total capital most recent | Adjusted beta | Unlevered beta | Unadjusted beta (raw) | Number of points | Ref. Index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Caterpillar Inc. | NYSE:CAT | United States | USD | 09/2017 | 91'365 | 70 | 35'925 | 27.69% | 1.195 | 0.871 | 1.293 | 60 | S&P 500 Index |
| Komatsu Ltd. | TSE:6301 | Japan | JPY | 09/2017 | 33'281 | 76'600 | 817'321 | 17.24% | 0.994 | 0.823 | 0.991 | 60 | Nikkei 225 Index |
| Wacker Neuson SE | DB:WAC | Germany | EUR | 09/2017 | 2'430 | - | 233 | 10.09% | 1.074 | 0.966 | 1.111 | 60 | Cdax Index |
| Terex Corporation | NYSE:TEX | United States | USD | 09/2017 | 3'952 | 1 | 985 | 19.54% | 1.597 | 1.285 | 1.895 | 60 | S&P 500 Index |
| BAUER Aktiengesellschaft | XTRA:B5A | Germany | EUR | 09/2017 | 601 | 4 | 742 | 58.89% | 1.152 | 0.474 | 1.228 | 60 | Cdax Index |
| Kato Works Co., Ltd. | TSE:6390 | Japan | JPY | 09/2017 | 347 | 886 | 34'630 | 45.78% | 1.069 | 0.579 | 1.103 | 60 | Nikkei 225 Index |
| Tadano Ltd. | TSE:6395 | Japan | JPY | 09/2017 | 2'050 | 544 | 36'643 | 13.37% | 1.298 | 1.124 | 1.447 | 60 | Nikkei 225 Index |
| The Manitowoc Company, Inc. | NYSE:MTW | United States | USD | 09/2017 | 1'349 | - | 288 | 17.20% | 0.588 | 0.487 | 0.381 | 60 | S&P 500 Index |
| Low | | | | | | | | 10.09% | 0.588 | 0.474 | | | |
| Average | | | | | | | | 26.22% | 1.121 | 0.826 | | | |
| Median | | | | | | | | 18.39% | 1.113 | 0.847 | | | |
| High | | | | | | | | 58.89% | 1.597 | 1.285 | | | |

Source: Capital IQ

Valuation date: 31 December 2017

(1) All values are in millions

# 2 Cost of equity
## Small size premium or size premium



### Extended formula

- On average, smaller companies achieve higher risk-adjusted returns. In the long run, higher returns are related with higher risk
- The additional return of smaller companies is not fully reflected in the CAPM (i.e. beta is underestimated)
- To reflect the additional risk of smaller companies more adequately, the cost of equity derived from the CAPM is adjusted with a size premium

$$c_e = r_f + \beta' \, MRP + SP$$

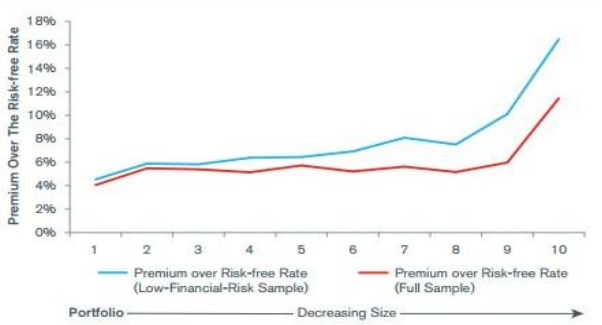
Where

- $c_e$ = Cost of equity
- $r_f$ = Risk free interest rate
- β = Beta (correlation measure of equity with market returns)
- MRP = Expected market return less risk free interest rate)
- SP = Size premium

### EY Switzerland best practice

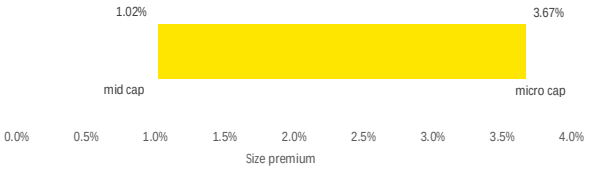
- EY Switzerland applies the size premium derived from a study published in Duff & Phelps - Valuation Handbook 2017. The smaller a company's market capitalization, the higher the size premium
- N.B. According to standard Anglo-Saxon risk literature, systematic risk is considered in the cost of capital (i.e. the WACC), whereas unsystematic is accounted for in the cash flows or with discounts on the asset/company value. We recommend including only the small size premium in the WACC. Other unsystematic risks should be accounted for in the cash flows or with general discounts on the asset / company value

**Size premium over the risk free rate by size portfolio**




Source: Duff & Phelps – 2014 European size study

**Small size premium range**




Source: Duff & Phelps – Valuation handbook 2017

# 3

## Cost of debt

# 3 Cost of debt
## Overview



### Basic formula

- Cost of debt is determined by a company's
- debt capacity (leverage, interest rate coverage, debt / EBITDA multiple etc.)
- the overall market condition and
- the company's access to financing

$$c_d = r_f + \text{credit spread}$$

Where

- $c_d$ = Cost of debt
- $r_f$ = Risk free rate

### EY Switzerland best practice

- Cost of debt as an input to the WACC is typically calculated on an after tax basis to reflect the tax deductibility of debt (tax shield on interest) if taxes in the cash flow calculation are based on EBIT x tax rate (i.e. notional taxes)

| Weighted average cost of capital | | | Comments (source) |
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| Base rate / "risk free" rate | 0.22% | a | Implied yield on 10-year government bond of Switzerland in local currency, 5 years historic average (Capital IQ) |
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| Base rate / "risk free" rate | 0.22% | h | Implied yield on 10-year government bond of Switzerland in local currency, 5 years historic average (Capital IQ) |
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| **Cost of debt** | **1.32%** | **k** | **= h + i + j** |
| Equity ratio | 81.61% | l | Capital structure derived from peer group median value (Capital IQ) |
| Debt ratio | 18.39% | m | Capital structure derived from peer group median value (Capital IQ) |
| Corporate income tax rate | 20.00% | n | Corporate income tax rate (EY Worldwide Corporate Tax Guide) |
| **WACC (rounded)** | **8.5%** | | **= g x l + k x m x (1 - n)** |

Source: see comments
Valuation date: 31 December 2017

# 3 Cost of debt
## Credit spread



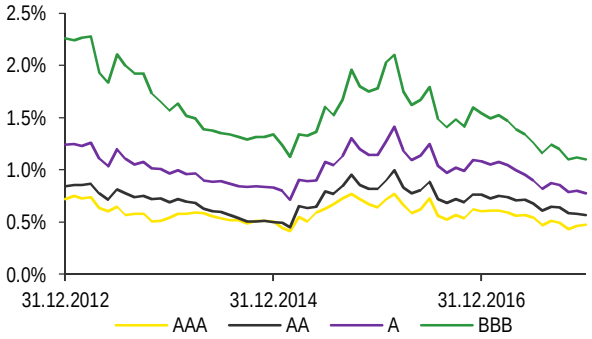
### Key points to consider

- Companies have to compensate its creditors for the risk of a potential default. The credit spread represents the expected compensation of creditors of investments of a specific risk category compared to a risk free investment
- The credit spread should reflect the assumed leverage and debt capacity

### EY Switzerland best practice

- Application of credit spread according to a corporate bond reference index with adequate geographic focus and a respective rating

**Credit spread – Barclays Europe Aggregate**




Source: Capital IQ

- Alternative sources based on the average rating of the peer group are credit spread tables from Reuters

**Credit rating of peer group companies**

| Companies | Ticker | Effective date | Rating | Outlook |
|---|---|---|---|---|
| Caterpillar Inc. | NYSE:CAT | 12/2017 | A | Stable |
| Komatsu Ltd. | TSE:6301 | 12/2017 | A | Stable |
| Terex Corporation | NYSE:TEX | 12/2017 | BB | Negative |
| BAUER Aktiengesellschaft | XTRA:B5A | 12/2017 | NR | NR |
| The Manitowoc Company, Inc. | NYSE:MTW | 12/2017 | B | Negative |

Source: Capital IQ
Valuation date: 31 December 2017

# 4

## Other parameters

# 4 Other parameters
## Determination of debt and equity



### Debt versus equity

- Determination of capital structure requires further clarification
- Certain balance sheet items may not obviously be classified as debt or equity
  - Minority interests
  - Preferred equity
  - (Over)/underfunded pensions

### EY Switzerland best practice

1. Minority interests and preferred equity are classified as equity
2. (Over)/underfunded pensions are only considered if they reflect a “true” financial liability (which is e.g. not the case for Swiss IAS19 liabilities) or consistently reported by peer group companies
3. Balance sheet items which are classified as debt and interest bearing
4. Cash and cash equivalents are not considered, i.e. total debt = gross debt (as opposed to net debt), assuming that the cash a company holds is “on average” operational

| | | 1 | | 2 | 3 | | | | | | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Companies | Currency | Minority interests | Preferred equity | (Over)/Underfunded pensions | Short-term liabilities | Long-term liabilities | Current Portion of Long-Term Debt | Current Portion of Cap Leases | Capital Leases | Finance Div. Debt Current | Finance Div. Debt Non-Current | Cash and equivalents | Total debt |
| Caterpillar Inc. | USD | 70 | - | n/c | 11 | 8'820 | 5 | - | - | 11'074 | 16'015 | n/c | 35'925 |
| Komatsu Ltd. | JPY | 76'600 | - | n/c | 227'594 | 513'892 | 75'835 | - | - | - | - | n/c | 817'321 |
| Wacker Neuson SE | EUR | - | - | n/c | 78 | 155 | 0 | - | - | - | - | n/c | 233 |
| Terex Corporation | USD | 1 | - | n/c | - | 980 | 5 | - | - | - | - | n/c | 985 |
| BAUER Aktiengesellschaft | EUR | 4 | - | n/c | - | 418 | 324 | - | - | - | - | n/c | 742 |
| Kato Works Co., Ltd. | JPY | 886 | - | n/c | 4'988 | 22'737 | 6'905 | - | - | - | - | n/c | 34'630 |
| Tadano Ltd. | JPY | 544 | - | n/c | 14'676 | 21'289 | - | 239 | 439 | - | - | n/c | 36'643 |
| The Manitowoc Company, Inc. | USD | - | - | n/c | - | 277 | 10 | - | - | - | - | n/c | 288 |

Source: Capital IQ

Valuation date: 31 December 2017

(1) All values are in millions

# 4 Other parameters
## Currencies



### Key points to consider

- The currency of the base rate should be consistent with the currency in which the free cash flows are denominated
- The base rate should be determined by where a company generates its free cash flows and not (per se) where it is legally domiciled
- The company value should remain constant when considering different currencies (to avoid company under- or overvaluation)
- Interest rate parity theory (covered): Interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate
- Forward rates are not available for all currencies
- Long-term forward rates are generally difficult to come by

### EY Switzerland best practice

Swiss company (Reporting currency: CHF)

- **Case 1 | Free cash flows: 100% CHF**
  - Cash flows are subject to 100% CHF related risks
  - Swiss government bond as base rate
- **Case 2 | Free cash flows: 50% CHF and 50% USD. Local USD business plan converted into CHF using forward rates**
  - Due to the conversion with forward rates, free cash flows are subject to CHF related risks only
  - Swiss government bond as base rate
- **Case 3 | Free cash flows: 50% CHF and 50% USD. Local USD business plan converted into CHF using spot rates**
  - Due to the conversion with spot rates, USD free cash flows are subject to USD currency risks
  - Weighting of USD and CHF government bonds according to free cash flow split

# 4 Other parameters
## Country risk premium



### "Damodaran approach"

Base rate (US/EUR/CH)

+ Inflation differential

+ [ Market risk premium incl. 0.11 CRP ] x Beta

+ Size premium

+ 0.89 CRP

**= Cost of equity**

Base rate (US/EUR/CH)

+ Inflation differential

+ adj. default spread

+ Credit spread

**= Cost of debt**

Where:

- CRP = Country risk premium

### EY Switzerland best practice

- Use of a local government bond rate which reflects (to a certain extent) specific country risk, if possible:
  - Requires availability of adequate financial information for appropriate base rate (i.e. monthly average of 10-year government bond over 5 years on Capital IQ)
  - No integration of specific country risk premium required, as it is already reflected in the respective base rate
  - Can lead to inflated discount rates in case of excessive credit risk, e.g. in the case of Spain, Italy, Portugal, Greece during debt crisis
- Alternative approach:
  - Alternatively use Damodaran's country risk premiums on top of a USD, EUR or CHF base rate (adjusted for the inflation differential between the respective countries)
  - Country risk premium = Country rating-based default spread x 1.12 (factor of 1.12 to adjust for the additional volatility of equity markets as compared to bond markets)

| Weighted average cost of capital | | | Comments (source) |
|---|---|---|---|
| Base rate / "risk free" rate | 3.03% | a | Implied yield on 10-year government bond of Switzerland in local currency (Capital IQ) incl. inflation differential (Oxford Economics) |
| Market risk premium | 6.80% | b | Global market risk premium (market studies) incl. adjustment for Damodaran's country risk premium for Brazil (Risk premiums for other markets 2017 - Damodaran) |
| Adjusted unlevered beta | 0.847x | c | Derived from peer group median value (Capital IQ), adjustment according to Blume |
| Adjusted relevered beta | 1.038x | d | According to Practitioners' Method: Beta (relevered) = beta (unlevered) * (1 + D/E) |
| Size premium | 3.67% | e | Size premium for Micro-cap (Duff & Phelps, Valuation Handbook 2017) |
| Country risk premium | 3.47% | f | Adjusted default spread based on country risk for Brazil (Risk premiums for other markets 2017 - Damodaran) |
| **Cost of equity** | **17.22%** | **g** | **= a + b x d + e + f** |
| Base rate / "risk free" rate | 3.03% | h | Implied yield on 10-year government bond of Switzerland in local currency (Capital IQ) incl. inflation differential (Oxford Economics) |
| Credit spread | 1.10% | i | Credit Spread from Barclays Europe Aggregate Index - BBB |
| Country risk premium | 3.47% | j | Adjusted default spread based on country risk for Brazil (Risk premiums for other markets 2017 - Damodaran) |
| **Cost of debt** | **7.60%** | **k** | **= h + i + j** |
| Equity ratio | 81.61% | l | Capital structure derived from peer group median value (Capital IQ) |
| Debt ratio | 18.39% | m | Capital structure derived from peer group median value (Capital IQ) |
| Corporate income tax rate | 20.00% | n | Corporate income tax rate (EY Worldwide Corporate Tax Guide) |
| **WACC** | **15.2%** | | **= g x l + k x m x (1 - n)** |
| Inflation differential | | | |
| Long-term inflation rate Switzerland | 1.16% | o | Long-term inflation rate Switzerland (Oxford Economics) |
| Long-term inflation rate Brazil | 4.00% | p | Long-term inflation rate Brazil (Oxford Economics) |
| Inflation differential | 2.80% | q | Inflation differential between Switzerland and Brazil; (1 + p) / (1 + o) - 1 |
| Base rate / "risk free" rate Switzerland | 0.22% | r | Implied yield on 10-year government bond of Switzerland in local currency (Capital IQ) |
| **Base rate / "risk free" rate** | **3.03%** | | **= (1 + q) x (1 + r) - 1** |

Source: see comments
Valuation date: 31 December 2017

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