LISBON SCHOOL OF ECONOMICS & MANAGEMENT
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Valuation: Intrinsic value or fundamental value

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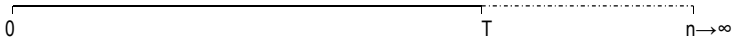
Intrinsic value or fundamental value

- actual value of a company or an asset based on an underlying perception of its true value including all aspects of the business, in terms of both tangible and intangible factors.
- This value may or may not be the same as the current market value
- It is ordinarily calculated by the present value of the future income generated by the asset/company

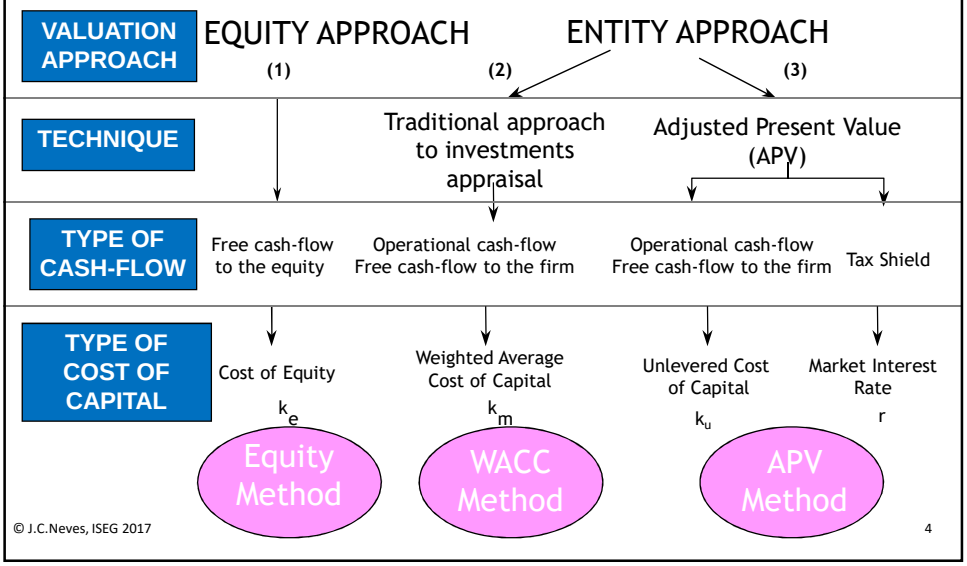
Discounted Cash Flow Valuation
General formula

$$V_0 = \sum_{i=0}^{n} \frac{CF_i}{(1+k)^i} = \sum_{i=0}^{T} \frac{CF_i}{(1+k)^i} + \frac{TV_T}{(1+k)^T}$$



V_0 – Present value of future cash flows
CF_i – cash flow for year i (definition of cash flow?)
k – Cost of capital adjusted to risk (definition of cost of capital?)
TV_T – Terminal value, (residual or de continuing) at year T
T – Last year of annual forecast

Three models of DCF



Agenda for learning about DCF valuations

- Cost of capital
  - Cost of equity
  - Cost of debt
  - Cost of prefered equity
  - Weighted average cost of capital (WACC)
  - Unlevered cost of capital
- Types of cash flow
  - Free cash flow to the equity
  - Free cash flow to the firm (Net operational cash flow)
- Terminal value approaches
- DCF methods
  - The equity method
  - WACC method
  - APV method
- Other complex situations

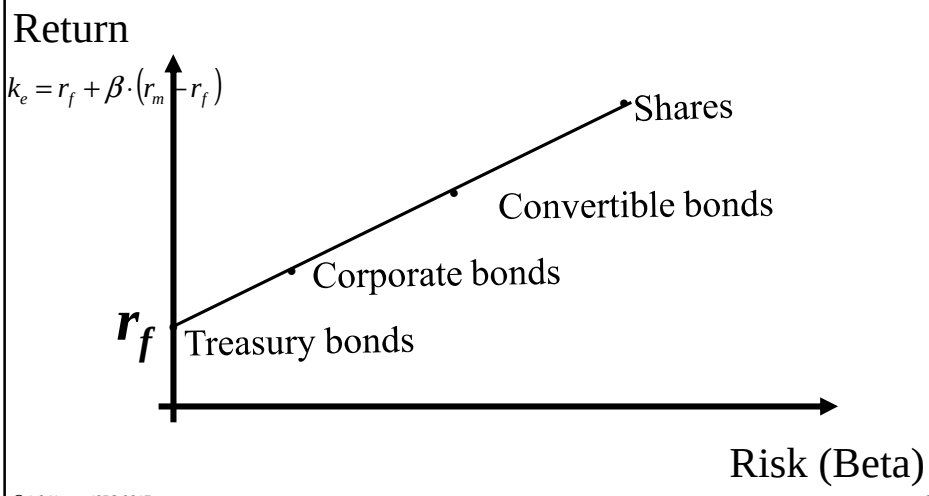
1. Cost of capital

Types of cost of capital

- Cost of equity (ke)
- Cost of debt (kd)
- Cost of prefered capital (kp)
- WACC (km)
- Unlevered cost of capital (ku)

i. Cost of equity (ke)

Financial markets
(CAPM - Capital Asset Pricing Model)



Models to estimate the cost of equity

- Historical based
  - **CAPM**
  - CAPM 2º moment
  - D-CAPM
  - Merton
  - APM – Arbitrage Pricing Model
  - Multifactors (Fama e French)
  - Regression
- Accounting Approach
  - **Modigliani e Miller**
  - Covariance of operational income
  - Covariance of sales
- Implicit prices using discounting models
  - Models of **Gordon**, Malkiel, H
  - EVA Model
  - DCF
- Compound betas
  - Leverage effect
  - Conservation of risk
  - Simultaneous equations
  - Regression of Business Units
- Implicit prices using options models
  - Shares (Hsia)
  - Options on shares (McNulty)

Most commonly used models to estimate the cost of equity (ke)

* CAPM

$$k_e = r_f + \beta\left(r_m - r_f\right)$$

r_f = Risk free rate of return
B = Beta
r_m= Market return
r_m-r_f = Market risk premium

* THE GORDON MODEL

$$k_e = \frac{d_1}{P_0} + g$$

d_1 = Dividend per share year 1
P_0 = Share price year 0
g = Growth rate in the long term

* THE MODIGLIANI & MILLER (M&M) MODEL

$$k_e = k_u + \left(k_u - k_d\right) \times \frac{D}{E} \times \left(1 - t\right)$$

k_u - Unlevered cost of capital
D - Debt
E - Equity
t - Corporate income tax rate

* PRACTICAL MODELS

$$k_e = k_d + \rho$$

$$k_e = r_f + \eta$$

k_d = Cost of debt
ρ= Risk premium over debt
η = Risk premium over Treasury Bonds

CAPM - A standard in the market

$$r_e = r_f + \beta\left(r_m - r_f\right)$$

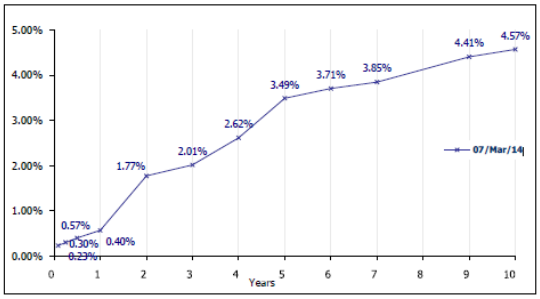
Choosing the CAPM variables!

- Risk free rate
  - Which rate to choose?
  - Stationary or variable?
- Market risk premium
  - Stationary or variable?
- Betas
  - Raw data, adjusted for market conditions, adjusted for trends?
- Cost of equity
  - Stationary or variable?
  - Nominal terms or real terms (constant)?

$$r_e = r_f + \beta \cdot (r_m - r_f)$$

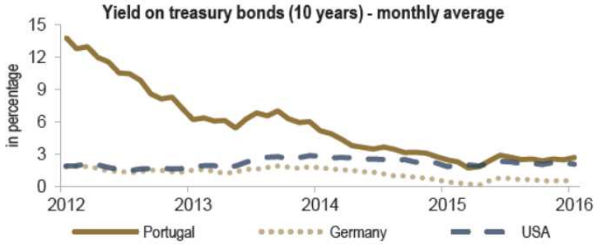
Risk free rate

Yield Curve
(Treasury Bonds Portuguese Governement)



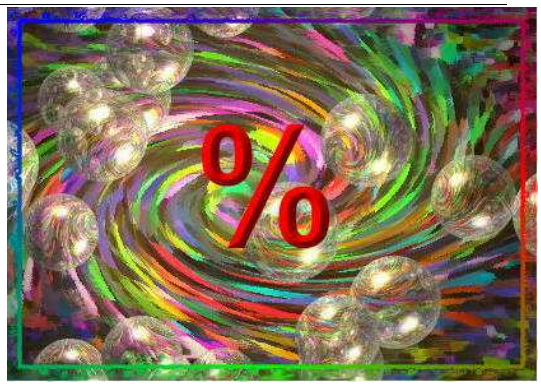
Euribor interest rates up to 1 year-maturity and Portuguese Treasury bonds for longer maturities.
Source: REUTERS

Yield curve (Treasury Bonds)
Portugal



Source: Reuters - Euribor until 1 yr maturity; Portuguese Treasury Bonds for longer maturities

Market risk premium (Rm-Rf)



Historical (naïve) equity risk premium is non-stationary

Figure 1:Gold price vs US equity risk premium

Standard error of equity risk premium against the number of years

Estimation Period	*Standard Error of Risk Premium Estimate*
5 years	20%/ √5 = 8.94%
10 years	20%/ √10 = 6.32%
25 years	20% / √25 = 4.00%
50 years	20% / √50 = 2.83%
80 years	20% / √80 = 2.23%

The longer the series is, the smaller the standard error

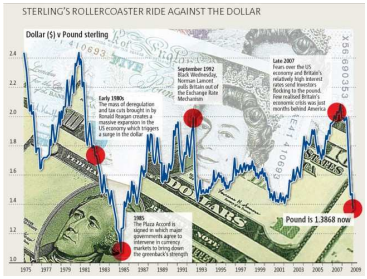
Equity risk premium varies across countries

TABLE 3
Equity Premium for Selected Countries

		Mean real return		
Country	Period	Market index (%)	Relatively riskless security (%)	Equity premium (%)
United Kingdom	1900–2005	7.4	1.3	6.1
Japan	1900–2005	9.3	−0.5	9.8
Germany	1900–2005	8.2	−0.9	9.1
France	1900–2005	6.1	−3.2	9.3
Sweden	1900–2005	10.1	2.1	8.0
Australia	1900–2005	9.2	0.7	8.5
India	1991–2004	12.6	1.3	11.3

Source: Dimson et al. (2002) and Mehra (2007) for India.

The country risk affects the equity risk premium



How to measure country risk: 1 – Sovereign ratings

Long-term sovereign debt ratings

Outlook: p= positive; s= stable; n= negative; CWn= credit watch negative

Country	*Ratings Agency*			*Investment Grade Ratings*
	Moody's	**S&P**	**Fitch**	
Britain	Aa1 s	AAA s	AAA n	**Aaa/AAA** Minimal risk
U.S.A.	Aaa n	AA+ n	AAA n	
Japan	Aa3 s	AA– n	A+ n	**Aa/AA** Very low
Euro zone				
Finland	Aaa s	AAA s	AAA s	**A/A** Low risk
Germany	Aaa n	AAA s	AAA s	
Luxembourg	Aaa n	AAA s	AAA s	**Baa/BBB** Moderate risk
Netherlands	Aaa n	AAA n	AAA s	
Austria	Aaa n	AA+ s	AAA s	
France	Aa1 n	AA+ n	AAA n	**Ba/BB** Substantial risk
Belgium	Aa3 n	AA n	AA s	
Estonia	A1 s	AA- s	A+ s	**B/B** High risk
Slovakia	A2 s	A s	A+ s	
Malta	A3 s	BBB+ s	A+ s	**Caa/CCC** Very high
Slovenia	Baa2 s	A CWn	A- n	
Italy	Baa2 n	BBB+ n	A- n	**SD/RD** Selective Default Restricted Default
Spain	Baa3 n	BBB- n	BBB n	
Ireland	Ba1 n	BBB+ n	BBB+ s	
Portugal	Ba3 n	BB n	BB+ n	
Cyprus	Caa3 n	CCC+ n	B n	
Greece	C s	B- s	CCC s	

Sources: Moody's, Standard & Poor's, Fitch

Staff, 24/02/2013 REUTERS

How to measure country risk: 2 – Country Risk Scores (0 a 100)

- The PRS Group
  - Political Risk Services
- ICRG
  - International Country Risk Guide
- The Economist

PS: Scores are not linear

Economist.com rankings

Country risk

Selected countries and territories, July 2008 (except where noted)

Least risky			Most risky		
Rank		Score*	Rank		Score
1	Switzerland †	12	120	Zimbabwe	86
2	Finland	14	119	Iraq	78
	Norway	14	118	Sudan	76
	Sweden **	14	117	Myanmar	75
5	Austria ††	16	116	Jamaica	69
6	Canada	17	115	Nicaragua	68
	Denmark †	17	114	Cuba	64
8	Germany **	18		Kenya	64
	Netherlands §	18	112	Cambodia	62
10	France **	19		Ecuador	62
11	Belgium **	20	110	Vietnam	61
	Singapore	20	109	Côte d'Ivoire	60
13	Hong Kong	23		Syria	60
	Japan	23	107	Lebanon	59
	Britain #	23		Venezuela	59

*Out of 100, with higher numbers indicating more risk. Scores are based on indicators from three categories: currency risk, sovereign debt risk and banking risk.

† May 2008; ** June 2008; †† January 2008; § February 2008; #March 2008

Source: Economist Intelligence Unit

How to measure country risk: 3 – Market data

- Bond default spread
  - Treasury bond of emergent country – Treasury bond of stable country
- Credit Default Swap Spreads
  - A credit default swap (CDS) is a financial swap agreement that the seller of the CDS will compensate the buyer in the event of a loan default or other credit event.
- Relative volatility of markets
  - volatilidade of emergent country / volatilidade of stable country

Risk premium based on "Bond Default Spread"

Equity risk premium = Equity risk premium in USA + Emergent country risk premium
(4,79%) (?)

$$CRP = CDS \frac{\sigma_e}{\sigma_T}$$

CRP= Country Risk Premium
CDS = Country Default Spread
= Treasury Yield of Emergent Country – USA Treasury Yield
σ_e = Standard deviation of shares
σ_T = Standard deviation of Treasury Bonds

India Example from Damodaran, The Dark Side of Valuation, p. 68:

$$CRP = 3\% \times \frac{31{,}82\%}{14{,}90\%} = 6{,}43\%$$

$$ERP = ERP_{USA} + CRP_{Emergent} = 4{,}79\% + 6{,}43\% = 11{,}22\%$$

Equity risk premium based on "relative volatility of markets"

$$ERP_{Emergent} = ERP_{USA} \frac{\sigma_{Emergent}}{\sigma_{USA}}$$

$ERP_{Emergent}$ = Equity risk premium of emergent market
ERP_{USA} = Equity risk premium of USA
$\sigma_{Emergent}$ = Standard deviation of shares in the emergent country
σ_{USA} = Standard deviation of shares in USA or equivalent country

Brasil example:

$$ERP_{Brasil} = 4{,}79\% \times \frac{25{,}83\%}{15{,}27\%} = 8{,}1\%$$

$$CRP = 8{,}1\% - 4{,}79\% = 3{,}31\%$$

Betas

CAPM and Market Model

- CAPM

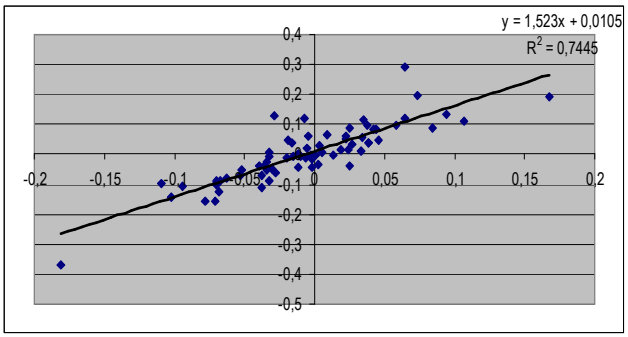
$$r_e = r_f + \beta.(r_m - r_f)$$

$$r_e - r_f = \beta \cdot (r_m - r_f)$$

- Market Model (used by Bloomberg) $r_e = a + b.r_m$

- Bloomberg, Datastream, Reuters, etc.

Market model applied to Portugal Telecom



Regression Statistics	
Multiple R	0.8628
R Square	0.7445
Adjusted R Square	0.74073
Standard Error	0.049797
Observations	70

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	1	0.491323	0.491323	198.132	7.91E-22
Residual	68	0.168625	0.00248		
Total	69	0.659947			

	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.0105	0.005988	1.759343	0.083017	-0.001414	0.022483098
X Variable 1	1.523	0.108201	14.07594	7.91E-22	1.307118	1.73894096

Levered betas and unlevered betas

$$\frac{\beta_E}{1+\frac{D}{E}(1-t)} = \beta_u$$

Industry	Number of firms	Beta	Market D/E	Tax rate	Unlevered Beta
Advertising	38	1,02	69,06%	30,60%	0,69
Aerospace and Defense	27	1,02	36,89%	20,49%	0,79
Agricultural Products	33	0,82	63,38%	15,71%	0,53
...	...	...	...	...	...
Tires and Rubber	5	1,37	147,21%	32,84%	0,69
Tobacco	4	0,58	53,27%	24,63%	0,41
Trading Companies and Distributors	49	1,19	158,87%	25,88%	0,55
Trucking	16	0,93	142,43%	17,08%	0,43
Water Utilities	12	0,60	137,38%	39,13%	0,33
Wireless Telecommunication Services	11	1,00	45,26%	25,30%	0,75
Grand Total	**4167**	**1,04**	**85,33%**	**20,93%**	**0,80**

Source: http://pages.stern.nyu.edu/~adamodar/

ii. Cost of debt (kd)

Cost of debt
Ranked by best practice

- The company has bonds quoted:
  - Use the yield to maturity
- The company has a rating but no bond is quoted:
  - Use yield to maturity of identical risk bonds
- No bonds are quoted and no rating:
  - Interets rate of next loan
  - Interest rate of most recent loan
  - Estimate a syntetic rating base on Times interest earning
  - Average cost of debt

Reuters corporate default spreads 2013

Rating	1 yr	2 yr	3 yr	5 yr	7 yr	10 yr	30 yr
Aaa/AAA	14	16	27	40	56	68	90
Aa1/AA+	22	30	31	48	64	77	99
Aa2/AA	24	37	39	54	67	80	103
Aa3/AA-	25	39	40	58	71	81	109
A1/A+	43	48	52	65	79	93	117
A2/A	46	51	54	67	81	95	121
A3/A-	50	54	57	72	84	98	124
Baa1/BBB+	62	72	80	92	121	141	170
Baa2/BBB	65	80	88	97	128	151	177
Baa3/BBB-	72	85	90	102	134	159	183
Ba1/BB+	185	195	205	215	235	255	275
Ba2/BB	195	205	215	225	245	265	285
Ba3/BB-	205	215	225	235	255	275	295
B1/B+	265	275	285	315	355	395	445
B2/B	275	285	295	325	365	405	455
B3/B-	285	295	305	335	375	415	465
Caa/CCC+	450	460	470	495	505	515	545
US Treasury Yield	4.74	4.71	4.68	4.63	4.60	4.59	4.56

Spread values represent basis points (bps) over a US Treasury security of the same maturity, or the closest matching maturity.

Rating and interest coverage ratio

For smaller non-financial service companies
(market cap < $ 5 billion)

If interest coverage ratio is			
greater than	**≤ to**	**Rating is**	**Spread is**
12.5	100000	Aaa/AAA	0.75%
9.5	12.499999	Aa2/AA	1.00%
7.5	9.499999	A1/A+	1.10%
6	7.499999	A2/A	1.25%
4.5	5.999999	A3/A-	1.75%
4	4.499999	Baa2/BBB	2.25%
3.5	3.9999999	Ba1/BB+	3.25%
3	3.499999	Ba2/BB	4.25%
2.5	2.999999	B1/B+	5.50%
2	2.499999	B2/B	6.50%
1.5	1.999999	B3/B-	7.50%
1.25	1.499999	Caa/CCC	9.00%
0.8	1.249999	Ca2/CC	12.00%
0.5	0.799999	C2/C	16.00%
-100000	0.499999	D2/D	20.00%

Source: Damodaran, 2016

iii. Cost of prefered equity (kp)

Cost of prefered shares

- No growth of dividends:
  - = dividends/Price
- Constant growth of dividens:
  - = (Dividends/Price) + g
- If there are special rights
  - Use the options theory

Hibrid securities

- Decompose the security into equity and debt

iv. Weighed average cost of capital (km)

Weighted average cost of capital (km)

$$k_m = k_e \frac{E}{C} + k_p \frac{E_p}{C} + k_d \frac{D}{C}(1-t)$$

$$k_m = k_u \cdot \left(1 - t \frac{D}{C}\right)$$

E – Equity based on ordinary shares
E_p – Equity based on prefered shares
D – Debt
C = Invested Capital = $E+E_p+D$
t = Tax rate

v. Unlevered cost of capital (ku)

Unlevered cost of capital (ku)

- CAPM

$$k_u = r_f + \beta_u \left(r_m - r_f \right)$$

- MODIGLIANI & MILLER

$$k_u = \frac{k_m}{1 - t \times \frac{D}{D + E}}$$

Hamada Formula:

$$\beta_u = \frac{\beta_e + \beta_D \left(D / E \right)}{1 + D / E \left(1 - t \right)}$$

Hamada Formula Simplified:

$$\beta_U = \frac{\beta_E}{1 + \frac{D}{E}(1 - t)}$$

$$k_u = \frac{k_e + \frac{D}{E} k_d \left(1 - t \right)}{1 + \frac{D}{E} \left(1 - t \right)}$$

2. Types of cash flows

Free cash flow ou Free cash flow to the equity

+ Net profit
+ Amortizations & Depretiations
+ Provisions
+ Impairments
+/- Regularizations
- Increase of working capital requirements
- Capex
+ New loans
- Payment of loans

Operational cash flow or Free cash flow to the firm

+ Operational income
- Tax on operational income
= NOPAT (Net Operating Profit After Taxes)
+ Amortization and depreciation
+ Provisions
+ Impairment
+/- Regularizations
- Increase of working capital requirements
- Capex

3. Methods to estimate terminal value

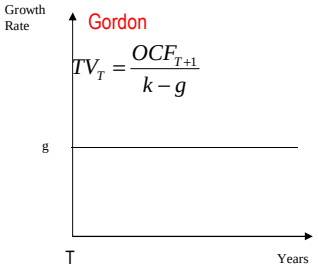
Methods to estimate terminal value

- Discounted cash flow models
  - No growth model
  - Constant growth model (Gordon)
  - Two phases of constant growth model (Malkiel)
  - Three phases of constant growth model (H of Fuller and Hsia)
- Relative valuation
- Cost approach

Terminal value: DCF Models

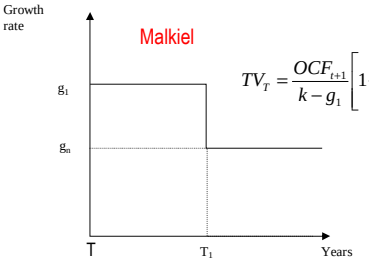
Gordon

$$TV_T = \frac{OCF_{T+1}}{k-g}$$



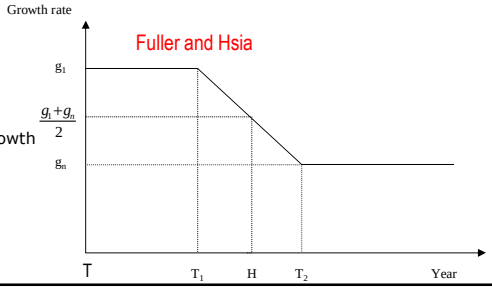
Malkiel

$$TV_T = \frac{OCF_{t+1}}{k-g_1}\left[1-\frac{g_1-g_n}{k-g_n}\left(\frac{1+g_1}{1+k}\right)^{T-1}\right]$$



Fuller and Hsia

$$TV_T = \underbrace{\frac{OCF_T(1+g_n)}{k-g_n}}_{\text{Stable growth}} + \underbrace{\frac{OCF_T \cdot H \cdot (g_1-g_n)}{k-g_n}}_{\text{Supra-normal growth}}$$



$$H = \frac{T_1 + T_2}{2}$$

Cautions

- Terminal may represent 60% to 80% of company value or more
- Failure to estimate terminal value implies incorrect valuation
- Cash flows for terminal value valuation must be normalized;
- Careful with the estimation of working capital requirements (WCR) and Capex in the cash flow of the perpetuity;
- Growth rate: Real growth + inflation for nominal cash flows
- Se g>inflation implies a continuing investment in capex and WCR

4. DCF Methods

i. Equity method

Equity method

$$V_E = \sum_{i=1}^{n} \frac{FCFE_i}{(1+k_e)^i} = \sum_{i=1}^{T} \frac{FCFE_i}{(1+k_e)^i} + \frac{TV_T}{(1+k_e)^T}$$

V_E – Equity Value
$FCFE_i$ – Free cash flow to Equity for year i
k_e – Cost of equity
TV_T – Terminal value in year T

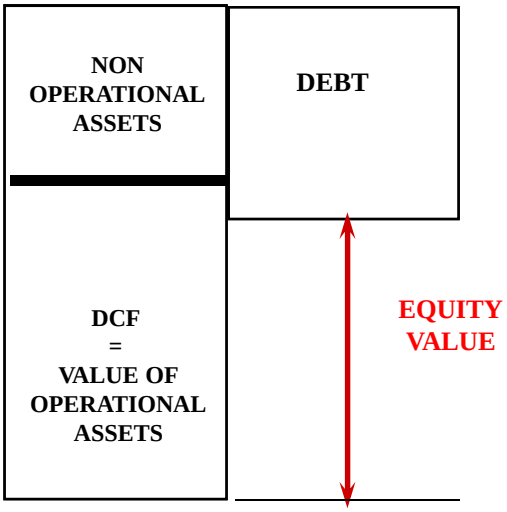
ii. WACC method

WACC method

$$V_E = \sum_{i=1}^{T} \frac{FCFF_i}{(1+k_m)^i} + \frac{TV_T}{(1+k_m)^T} + VNOA - D_0$$

$FCFF_i$ – Free cash flow to the firm in year i
k_m - WACC
D_0 - Debt in year 0
TV_T – Terminal value in year T
VNOA – Value of non operational assets (cash & others)

WACC method



iii. APV – Adjusted Present Value

Adjusted Present Value

$$V_E = \sum_{i=1}^{T} \frac{FCFF_i}{(1+k_u)^i} + \frac{TV_T}{(1+k_u)^T} + VCD + VNOA - D_0$$

$FCFF_i$ – Free cash flow to the firm in year i
k_u – Unlevered cost of capital
TV_T – Terminal value in year T
VCD – Valued created by Debt
VNOA – Value of non operational assets
D_0 – Debt at present

Value created by debt

GERAL FORMULA:

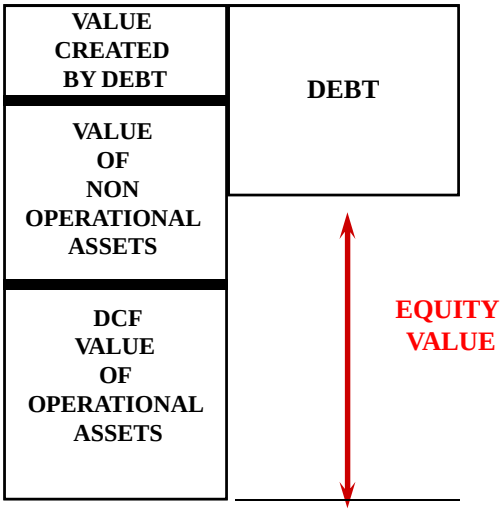
$$VCD = L_0 - \sum_{i=1}^{n} \frac{FE_i(1-t) + LP_i}{(1+r)^i}$$

IF k_d=r :

$$VCD = \sum_{i=1}^{n} \frac{FE_i \times t}{(1+r)^i} = \sum_{i=1}^{T} \frac{FE_i \times t}{(1+r)^i} + \frac{TVCD_T}{(1+r)^T}$$

VCD – Value created by debt
FE_i – Financial expenses in year i
t – tax rate
r – market interest rate
k_d – Company interest rate

APV method



5. More complex cases

More complex cases

- Large variance in the capital structure
- Continuing negative cash flows
- Assets that do not generate cash flows
- Banruptcy risk
- High correlation with th eeconomic cycle
- Existance of options

One example

See the example in the platform

Working Groups

Case study:

Valuation of a Company

Steps to conduct the valuation project:

1) Industry analysis and competitiveness
2) Financial statement analysis
3) Assumptions for future
4) Forecast of financial statements and cash flow
5) Apply a DCF model and estimate intrinsic value
6) Develop a sensitivity analysis
7) Use relative valuation
8) Conclusion