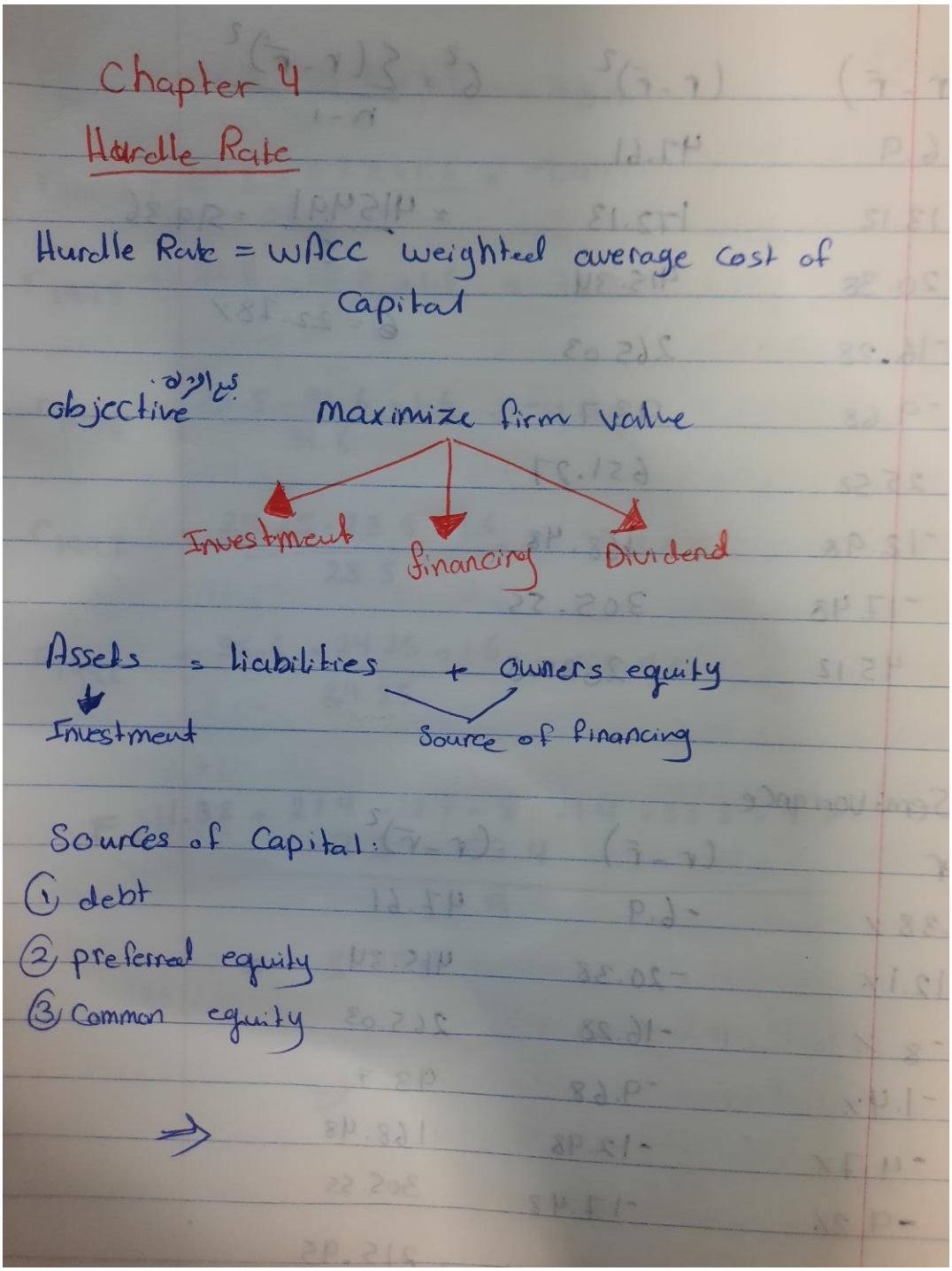
ASIL SHAAR (CORPORATE FINANCE(FINN3300))

CHAPTER 4



$$WACC = w_d * k_d + w_p * k_p + w_s * k_s$$

- k_d ← Cost of dept
- k_p ← Cost of Preferred stock
- k_s ← Cost of common equity.

Calculating Cost of Common equity

CAPM $E(r) = R_F + b\,[\underbrace{E(r_m) - R_F}_{\text{Risk premium}}]$

نفس الـ Cost بالـ تحملها الشركة.

In order to use CAPM we need to determine the following:

① R_F ② beta ③ Market risk premium.

* Risk free Rate:

↳ rate of return on a risk free assets.

for an assets to be risk free two condition must be:

① NO default Risk

② NO uncertinity about investment rate.

Estimating risk free rate:

R_f → rate of return on long-term governmental bond

Risk free rate should be, in the same currency in which cashflows are estimated.

Risk free rate: default free governments

$$R_f = r^* + I\,P$$

r^*: real rate of interest

$I\,P$: inflation premium.

* If bonds were issued by different governments that are Aaa rated, there will be differenciacion the risk free rates due to expected inflation.

Risk free rate: governments have default risk

* If the governat issues long term bond in the local currency, then we should adjust the governmet bond rate by the estimated default spread to arrive at a risk less local currency rate.

* Risk_free Rate : No local currency government bonds. لا يوجد سندات حكومية بالعملة المحلية

(a) Build up approach

$$R_f = r^* + IP$$

r^* : real rate of interest

IP : inflation premium

↳ rate on inflation index Treasuries

⇒ These treasuries offer a guranteed real rate of return.

(b) Differential inflation approach

We start with a risk free rate in the US dollar and add the differential between expected inflation in the average in question

Ex: R_F Brazil = ? ten year treasury bond

R_F USA . 2.75%

Inflation US higher than Brazil by 3%

R_F Brazil = 2.75% + 3% = 5.75%

$$E(r) = R_f + b\,[E(rm) - R_f]$$

R_f ↓ rate on a long term goverment bond.

$[E(rm) - R_f]$ market risk premium = equity risk premium (ERP) To estimate ERP we can use one of the following approaches:

1. survey approach
2. historical approach.
3. Implied ERP approach.

* Market risk premium > 0

Risk preference:

1. Risk avers
2. Risk seekers
3. Risk neutral

* market risk premium increases if the degree of the risk aversim of investors increases.
* Market risk premium increases if the risk of the average risk investment increases.

→

① survey approach :

limitations:

ⓐ There are no constraints on reasonability

ⓑ survey approach used to calculate ERP reflects the past and not the future.

ⓒ survey to be short term.

ex : ① R_f 4%.

② mutual fund → return is uncertain

a. less than 4%

b. between 4% - 6%

c. between 6% & 8%

d. between 8% - 10%

e - between 10% - 12%

f - more than 12%

⇒

② Historical approach.

ⓐ Determine the time period used.

ⓑ choose the risk free security (long-term government of bond)

ⓒ Arithmetic versus geometric averages.

Arithmatic average $= \frac{\Sigma X}{n}$

Expected ERP = Arithmatic average (market return) − Arithmatic average R_F

geometric average = ?

terminal value $= (1+r_1)(1+r_2)(1+r_3)\ldots(1+r_n)$

geometric average $= (\text{terminal value})^{\frac{1}{n}} - 1$

limitations:

① It assume that the degree of risk aversion of investors has not change ~~over~~ increase time

⇒

② It assumes that the riskiness of average risk investment has not changed over time.

A modified ERP in emarging markets.

ERP = ERP for a + Country premium.

Using the historical approach — mature market

To estimate the Country premium, we can use of the following approach:

ⓐ use the Country bond default spread.

The Cantry's brod default spread will be used as a measure of the Country premium.

$ERP_X = ERP_{US} + default\ spread_X$

Examples

$ERP_{US} = 4.2\%$

default spread index = 2.25%

" " Brazil = 2%

ERP_{Brazil} ??

ERP index??

$ERP_{Brazil} = 4.2\% + 2\%$
$= 6.2\%$

$ERP_{index} = 4.2\% + 2.25\%$
$= 6.45\%$

(b) Relative standard deviation.

relative standard deviation = measure of country premium.

$$\text{relative S.D} = \frac{6x(\text{stock price})}{6_{US}(\text{stock prices})}$$

$$ERP_x = ERP_{US} * \text{relative SD}$$

$$ERP_x = ERP_{US} * \frac{6x(\text{stock price})}{6_{US}(\text{stock price})}$$

Example:

$ERP_{US} = 4.2\%$ $\quad ERP_{Brazil} = ??$

$SD_{US} = 15\%$

$SD_{Brazil} = 21\%$

$$ERP_{Brazil} = ERP_{US} * \frac{6_{Brazil}}{6_{US}} = 4.2\% * \frac{21\%}{15\%}$$

$$= \boxed{5.88\%}$$

$$\text{Country premium} = ERP_{Brazil} - ERP_{US}$$

$$= 5.88\% - 4.2\%$$

$$= \boxed{1.68\%}$$

© Default spread + relative standard deviation.

$$\text{Country premium} = \text{Country default spread} * \frac{\sigma_{\text{stock price}}}{\sigma_{\text{bond price}}}$$

Example:

$ERP_{US} = 4.2\%$ $\quad ERP_{Brazil} = ??$

$\sigma\ \text{equity}_{Brazil} = 21\%$

$\sigma\ \text{bond}_{Brazil} = 14\%$

default Brazil = 2%

$$\text{Country premium} = 2\% * \frac{21\%}{14\%} = 3\%$$

$$ERP_{Brazil} = ERP_{US} + \text{Country premium}$$

$$4.2\% + 3\% = \boxed{7.2\%}$$

3 Implied ERP approach

الطريقة الضمنية

لقيمة السوق stock

Page 102

Standard and Poor$_{500}$ index = 1,756.54

Total annual cash flow = 82.35 = $CF_0 = D_0$

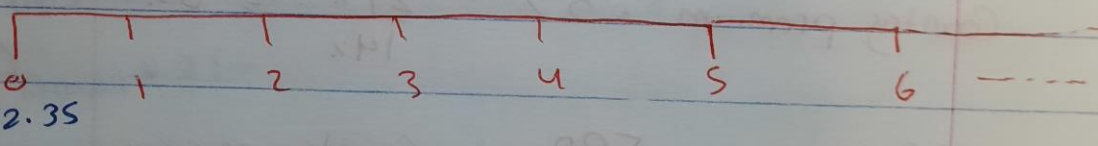
$g_1 = 5.59\%$ for the first five years.

and $g_2 = R_f = 2.55\%$ thereafter

$r = ?\%$ = $E(r_m) = ?\%$

Implied ERP ?%

price = Σ pv of expected cash flows.



$CF_1 = CF_0(1+g_1) = 82.35(1+5.59\%) = 86.96$

$CF_2 = CF_1(1+g_1) = 86.96(1+5.59\%) = 91.82$

$CF_3 = CF_2(1+g_1) = 91.82(1+5.59\%) = 96.95$

$CF_4 = CF_3(1+g_1) = 96.95(1+5.59\%) = 102.38$

$CF_5 = CF_4(1+g_1) = 102.38(1+5.59\%) = 108.1$

$CF_6 = CF_5(1+g_2) = 108.1(1+2.55\%)$

$= 110.86$

$$1756.54 = \frac{86.96}{(1+r)^1} + \frac{91.82}{(1+r)^2} + \frac{96.95}{(1+r)^3} +$$

$$\frac{102.38}{(1+r)^4} + \frac{108.1}{(1+r)^5} + \left(\frac{110.86}{r - 2.55\%} * \frac{1}{(1+r)^5} \right)$$

$$r = 8.04\%$$

Implied ERP = 8.04% - 2.55%

= **5.49%**

$$E(r) = R_f + b^a \, ERP$$

(1) regression beta (historical beta)

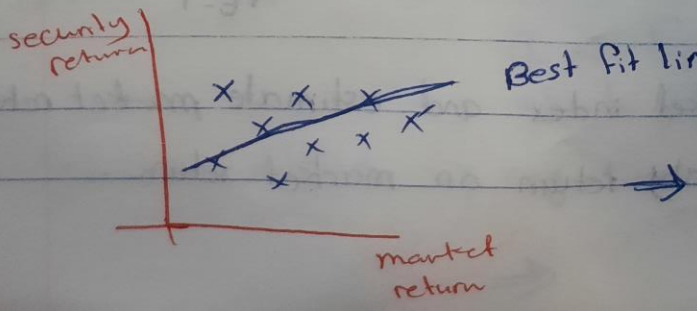
(2) Bottom - up beta

(3) Accounting beta.

Y = Dependent variable

X = independent variable.

simple regression : a tool that is used to estimate a relationship between a single dependent variable and a single independent variable.



$Y = m X + C$

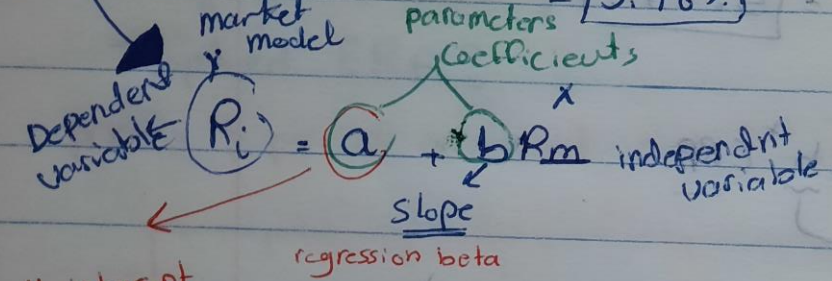
slope — y-intercept

Revenue us / Total Revenue

مثال من الكتاب

ERP Disny = 82.01% * 5.5% + 11.64% * 6.72% + 6.02% * 7.27% + 0.33% * 9.44%

= 5.76%



To estimate regression beta:

1. Decide on the estimation period.
2. frequency of data = monthly.
3. Estimate return on the security $r = \frac{P_t - P_{t-1} + Div}{P_{t-1}}$
4. Choose a market index and estimate market return
5. regress security return on market return.

67% confidence interval

$[B - SE^*1,\ B + SE^*1]$

95% confidence interval

$[B - SE^*2,\ B + SE^*2]$

↓ confidence interval.

$R_i = a + b^* Rm$

↳ market model

practical model

CAPM → theoretical model

CAPM

$E(r_i) = R_f + b^* [E(rm) - R_f]$

$E(r_i) = R_f + b^* E(rm) - b^* R_f$

$E(r_i) = R_f - b^* R_f + b^* E(rm)$

$E(r_i) - R_f(1-b) + b^* E(rm)$ Theory

↓ intercept ↓ slope

$a > R_f(1-b)$ ⇒ the stock did better than expected.

Jensen's alpha

⇓

$= a - (R_f(1-b))$

Jensen's alpha → positive.

$a < R_f(1-b)$ ⇒ the stock did worse the expected

Jensens alpha → negative

⇒

* $\alpha = R_F(1-b)$ ⇒ the stock did as expected
⇒ ∝ Jensen's alpha.

* Bottom up beta (fundamental beta)

Determinants of beta:

1. Type of product
2. Degree of operating leverage (higher leverage) higher risk

~~fixed~~ rent ← fixed cost

Risk ↑ variable ⇒

Operating Leverage: the use of fixed operating cost to magnify the effect of the change in Sales on the firms EBIT

Example:

	A	B	A	B
Revenus	$100	$100	$120	$120
F.C	$10	$80	$10	$80
V.C	$80	$10	$96	$12
EBIT	$10	$10	$14	$28

If sales increase 20%

EBIT = ??

$100(1+0.2) = 120$

(A) $80(1+0.2) = 96$ (B) $10(1+0.2)$

(A)

% Δ in Sales = 20%

% Δ in EBIT = ?

$\frac{14-10}{10}$ = 40%

(B)

% Δ in Sales = 20%

% Δ in EBIT = ?

$\frac{28-10}{10}$ = 180%

$DOL = \frac{\% \Delta \text{ in EBIT}}{\% \Delta \text{ in Sales}} = \frac{40\%}{20\%} = 2 > 1$

DOL ↙ degree of operating leverage

operating leverage exists

$DOL_B = \frac{180\%}{20\%} = 9$

Higher operating leverage → higher cash flow volatility → higher risk → higher beta.

(3) Degree of financial leverage

* Financial leverage : the use of fixed financing (debt, preferred stock) to magnify the effect of the change in EBIT on the firms EPS

* The higher the financial leverage → the higher the risk → the higher the beta.

* Regression beta = beta levered = equity beta → shows the impact of the three determinants of beta which are type of product, operating leverage and financial leverage.

* Beta unlevered = asset beta → shows the impact of the determinants of beta which are type of product and operating leverage.

$$\underset{\text{Beta levered}}{B_L} = \underset{\text{beta unlevered}}{B_u} * \left(1 + \underset{\text{tax rate}}{(1-t)} * \underset{\text{Debt equity}}{\frac{D}{E}}\right)$$

(3) (2) (1)

$B_L = B_u$ only if $\frac{D}{E} = 0$

no financial leverage

Effect of financial leverage on beta :

Debt to capital	D/E	beta	Disney
0	0	1.11	$B_L = 1.25$
10%	$\frac{10}{90} = 11.11\%$	1.19	tax rate = 36.1%
20%			$\frac{D}{E} = 0.1944$
⋮			$\frac{D}{E} = 19.44\%$
90%			B_U ??

$$1.25 = B_u * (1 + (1 - 36.1\%) * 19.44\%)$$

$$\frac{1.25}{1.124} = B_u * \frac{1.124}{1.124}$$

$$\boxed{B_u = 1.11}$$

$$\text{Debt to capital} = \frac{\text{Debt}}{\text{Capital}} = \frac{\text{Debt}}{\text{Debt + equity}}$$

$$B_L = 1.11 * \left(1 + (1 - 36.1\%) * \frac{10}{90}\right)$$

$$\frac{\text{Debt}}{\text{Capital}} = \frac{\text{Debt}}{\text{Debt + equity}} = \frac{10}{100}$$

∴ Debt = $\boxed{10}$ equity = $\boxed{90}$

R^2 = 39.4% $1-R^2$ = 60.6% → firm specific risk

R^2 → market risk

$1-R^2$ → firm specific risk

	beta	R^2
Diseny	1.25	0.73
Amgen	1.25	0.25

Undiversified, i.e. Desiny

Diversified indifferent

properties of beta:

Beta could be a weighted average.

Example bV?

Portfolio V

Assets	beta	proportion (weight)
A	1.5	20%
B	1	50%
C	0.8	30%
		100%

$$b_V = \sum_{\text{each asset}} w_{\text{each asset}} * b_{\text{each asset}}$$

$$b_V = 0.2 * 1.5 + 0.5 * 1 + 0.3 * 0.8 = \boxed{1.04}$$

Calculating beta for a combined firm:

Step 1: Calculate beta unlevered for each company

$$B_L = B_u * \left(1 + (1-t) * \frac{D}{E}\right)$$

tax rate = 36.1%

Bu Disney? Bu Capitar Cities?

$$1.15 = Bu * (1 + (1 - 36.1\%) * 0.1)$$

$$1.15 = Bu * 1.0639$$

$$\boxed{Bu = 1.08}$$

Capital Cities

$$0.95 = Bu * (1 + (1 - 36.1\%) * 0.1)$$

$$\boxed{Bu = 0.93}$$

Step 2 : Calculate beta unlevered for the Combined firm (weighted average)

B_u Disney = 1.08

Bu Capital Cities = 0.93

* $W_{Disney} = \frac{\text{Value of Disney}}{\text{Value of combined firm}} = \frac{34,286\text{ m}}{53,401\text{ m}} = \boxed{0.64}$

Value Combined firm = 34,286 m + 19,115 m

= $53,401 million

* $W_{Capital\ cities} = \frac{\text{Value of Capital Cities}}{\text{Value of combined firm}} = \frac{19,115\text{ m}}{53,401\text{ m}} = \boxed{0.36}$

$Bu = 0.64 * 1.08 + 0.36 * 0.93 = 1.02$

$Bu_{combined} = \sum w_{\text{each company}} * bu_{\text{each company}}$

→

Step 3: Calculate beta levered for the combined firm under 3 scenarios

S_1: If Desiny bought Capital Cities; with all equity.

Diseny (pre acquistion)

	Debt 3,186m
	Equity 31,100m
	34,286 m

Capital Cities (pre acquisitions)

	Debt 615m
	Equity 18,500m
	$19,115 m

Combined firm

Debt = 3,186 m + 615m = $ 3,801 m

Equity = 31,100 m + 18,500 = $ 49,600m.

$$B_L \text{ combined} = B_u * (1 + (1 - t) * \frac{D}{E})$$

$$= 1.02 * (1 + (1 - 36.1\%) * \frac{3,801 m}{49,600m})$$

$$= 1.07$$

يعني اصدرت اسهم وباعتهم في السوق وهي الديزني

اشترت اسهم لشركة ثانية.

S_2 : If Disney bought Capital Cities will all debt.

Combined firm

Debt	3,186 m + 615 m + 18,500 m = 22,301 m $
Equity	31,100 m

Disney ← Capital Cities

$$\beta_L = 1.02^{or}\left(1 + (1 - 36.1\%)\frac{22,301 m}{31,100 m}\right)$$

$$\boxed{\beta_L = 1.49}$$

S_3 : If Disney used a mixed debt & equity to buy Capital Cities

Debt = $ 10 billion = 10,000 million

the rest = equity.

Combined firm

Debt	3,186 m + 615 m + 10,000 m = 13,801 m $
Equity	31,100 m + 8500 m (18,500 − 10,000) = 39600 $

$$\beta_L = 1.02^{*}\left(1 + (1 - 36.1\%)^{*}\frac{13,801\,m}{39,600\,m}\right)$$

$$\beta_L = 1.25$$

(2) Bottom up beta

In order to Calculate bottom-up beta we have to the following:

(1) Determine the firm's business divisions.

Example: Disney

① Media
② Parks
③ Consumer products
④ studio entertainment
⑤ Interaction

(2) For each business division we should do the following:

(a) Find Comparable firms, The more firms the better.

example: studio entertainment disicion 10 Comparable firms (US firms that produces movies)

⇒

(b) Get levered beta (regression beta) for each firm of the comparable firms.

(c) Collect data on equity and debt and tax rate for each of the comparable firms.

(d) Calculate the average and the median of the levered beta.

(e) Calculate debt to equity ratio for each of the comparable firm

(f) Calculate the average and the median of the debt to equity ratio

(g) Calculate the average tax rate or the median.

(h) unlever the beta:

$$B_L = B_u * \left(1 + (1 - \text{tax rate}) * \frac{D}{E}\right)$$

B_u: average / median

tax rate: average or median

$\frac{D}{E}$: average / median.

اذا اخترت average بستخدمه في كل مرة و median كذلك

الأمر بنفس النظام

③ Calculate beta unlevered for all business operations:

βu for all business operations $= \sum w^{*} [\beta u]$ = weighted average.

w: each division; βu: each division

Weight for each division = $\frac{\text{Revenue from each division}}{\text{Total revenues}}$.

OR

Weight for each division = $\frac{\text{Value of each division}}{\text{Total firm value}}$.

④ Estimate beta levered for all business operations and cost of equity.

⑤ Estimate beta levered for each division and cost of equity for each division

Cost of equity $= R_f + b^{*} ERP$

Median / average

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

$$1.24 = \beta_U * (1 + (1 - 0.4) * 0.2706$$

$$\beta_U = 1.06$$

→ each business division

Calculating bottom up beta for an unlisted firm (private):

1. Get comparable firms
2. Get levered beta for each of comparable firms and calculate the average or median of beta levered
3. Get $\frac{D}{E}$ ratio for each of the comparable firms and calculate the average or median of $\frac{D}{E}$ ratio
4. Calculate the average of the median of the marginal tax rate
5. unlever the beta using the following formula:

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

6. Calculate beta levered for the private company of interest using the ~~average~~ median $\frac{D}{E}$ ratio for the →

whole industry the company operates in.

Calculating bottom up beta for an unlevered firm:

Beta_{L} median = 0.81 $\quad r^2_{\text{median}} = 0.26$

tax rate median = 0.4

D/E ratio median = 0.2141

$$B_L = B_U * \left(1 + (1-t) * \frac{D}{E}\right)$$

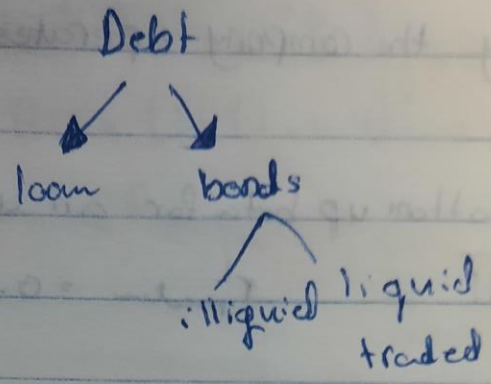
$$0.81 = BU * (1 + (1 - 0.4) * 0.2141$$

$$BU = 0.72$$

$\text{BL}_{\text{Bookscape}} = 0.72(1 + (1 - 0.4) * 0.2141)$

$= 0.81$

$$\frac{\beta}{\sqrt{R^2}} = \frac{0.81}{\sqrt{0.26}}$$



Calculating Cost of debt:

(a) If the firm issued bonds & they are liquid & traded, then:

$$P_B = \frac{I}{r}\left(1 - \frac{1}{(1+r)^n}\right) + \frac{par}{(1+r)^n}$$

(r → YTM)

Expected Cash flows for bonds
① interest payment
② par value

pre-tax Cost of debt k_d = YTM = yield to maturity

after tax cost of debt = pre tax Cost of debt * $(1-t)$

(b) If the firm issued boards but illiquid, then look at the issuer's rating (rating done by Credit agencies)

pre tax cost of debt = R_f + default spread (associated with the firms rating)

(c) If the firm is not rated or it has not issued bonds then:

(1) look at the last loan recived by the firm :
The interest on the loan = pre tax cost of debt.

(2) Do a synthetic rating for the firms :

Pre tax cost of dept $= R_f +$ default spread (associated with the rating done)

Synthetic rating :

time interest earned ratio = interest Coverage ratio $= \frac{EBIT}{\text{Interest expense}}$

Example

$R_f = 5.5\%$ $\quad 5.5\% + 0.4\% = \boxed{5.9\%}$

Calculating Cost of preferred stock :

$D_0 = D_1 = D_2 = D_3 \dots = D_N$

price $P = \frac{D}{r}$ → dividends
r → required rate of return

$r = \frac{D}{P}$

↓

present value of a perpetuity.

$\boxed{r = KP}$

⇒

$$WACC = w_d * k_d + w_p * k_p + w_s * k_s$$

k_d → pre tax cost of debt $(1-t)$

k_p → $k_p \cdot \frac{D}{P}$ after tax

k_s → CAPM after tax

- $X + M$
- R_F + default spread
- interest on the loan.

Weights:

① Book value weights

② Market Value weights

Calculating book value weights:

$$w_d = \frac{\text{Debt}}{\text{Debt} + \text{Preferred equity} + \text{Common equity}}$$

$$w_p = \frac{\text{Preferred equity}}{\text{Debt} + \text{Preferred equity} + \text{Common equity}}$$

$$w_s = \frac{\text{Common equity}}{\text{Debt} + \text{Preferred equity} + \text{Common equity}}$$

ERP = market risk premium = 5.5%

tax rate = 40%

page 156 [1] b = 0.95

Treasury bill rate = 5.8%

Treasury bond rate = 6.4%

Debt = $1.7 billion

Equity = $1.5 billion

tax rate = 36%

[a] ERP = 8.76%

short term investor

$E(r_i) = R_F + b * ERP$

$5.8\% + 0.95 * 8.76\% = 14.12\%$

[b] long term investor

$E(r_i) = R_F + b * ERF$ مش معطيني إياه ف بستخدم 5.5%

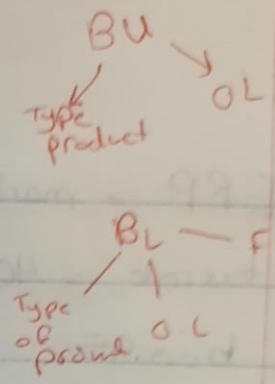
(cost of equity) $6.4\% + 0.95 * 5.5\%$

$= 11.63\%$

[c] Cost of equity = 11.63%

⇒

156



prop [2] Debt = $1.7 billion

Equity = $1.5 billion

tax rate = 36%

(a) $B_L = 0.95$

Bu ?

$$B_L = Bu * \left(1 + (1 - t) * \frac{D}{E}\right)$$

$$0.95 = Bu * \left(1 + (1 - 0.36) * \frac{1.7 \text{ billion}}{1.5 \text{ billion}}\right)$$

$Bu = 0.55$

(b) $\frac{0.55}{0.95} = 0.58$

↳ buisense risk

$1 - 0.58 = 0.42 \rightarrow$ Financial Risk

[3] $b = 1.7$

(a) Debt = 0

$R_f = 6.4\%$

ERP = 5.5%

$E(r) = 6.4\% + 1.7 * 5.5\%$

$k_s = 15.75\%$

⇒

(b) R_f زادت من 6.4 لـ 7.5

يعني ادى ع يزيد ، واذا يدي اعزن كم زاد يعوض في المعادلة .

$K_s = 7.5\% + 1.7 * 5.5\%$

$K_s = 16.75\%$

(c) ماني عليم دين دما في financial risk يعني

All risk is busines risk 100 %. $B_L = B_U$

(15) frequency of data = monthly

$R_{stock} = 3.28\% + 1.65 R_m$

Treasury bill rate = 4.8%

Treasury bond rate = 6.4%

no. of share = 265 million shares

$p = \$30$ per share عدد الاسهم

$R_i = a + b R_m$

$R^2 = 0.2$

long run ↑

ERP = 5.5%

short-run ← ERP = 8.76%

(a) $= E(r) = ?$

short_term

$E(r) = R_f + b * ERF$

$= 4.8\% + 1.65 * 8.76\%$

$E(r) = 19.25\%$

(b) $E(r) = R_F + b^* ERP$

long_run $6.4\% + 1.65 * 5.5\% = 15.47\%$

(c) Jensen's alpha = Intercept $-(1-\beta)R_F$

51.1% better than expected.

annually during the period of the regression

annualized $R_F = ?$

[monthly ~~w~~ plus

monthly $= (1 + 51.1\%)^{\frac{1}{12}} - 1$

∴ over performance $= 3.5\%$.

or.

Jensens alpha

$R^2 = 0.2$ $-(1-1.65)$

$3.5\% = 3.28\% + 0.65 R_F$

-3.28

$\frac{0.22\%}{0.65} = \frac{0.65 R_F}{0.65}$

$R_F = 0.338\%$

monthly

annualized R_F $= (1 + 0.338\%)^{12} - 1$

$= \boxed{4.1\%}$ ⇒

(d) $\frac{D}{E} = 0.03$

tax rate = 40%

they will aquire a new buisness will

Sell debt = $2 billion

b

↓

Combinced firm

$B_L = B_U * (1 + (1 - tax) * \frac{D}{E})$

$1.65 = B_U * (1 + (1 - 0.4) * 0.03)$

$B_U = 1.62$

pre acquisition.

equity = 265m * 30 = 7,950 million

$\frac{Debt}{equity} = 0.03$ $\frac{Debt}{7950} = 0.03$

Debt = 238.5 million.

Combinad firm

Debt	238.5m + 2000 million = 2238.5m
Equity	265m * 30 = 7950 million

$B_L = 1.62 * (1 + (1 - 0.4) * \frac{2238.5m}{7,950m}$

$B_L = 1.89$

page 158

(17) $\beta = 1.61$

Debt = 10 billion $

Equity = 10 billion $

tax rate = 40%

(a) β_U ?

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

$$1.61 = \beta_U * (1 + (1 - 0.4) * \frac{10 \text{ billion}}{10 \text{ billion}})$$

$$\boxed{\beta_U = 1.01}$$

(b) Debt ratio 10%

Debt ratio = Debt to Capital = $\frac{\text{Debt}}{\text{Debt + equity}}$

Current debt ratio = $\frac{10 \text{ billion}}{10 \text{ billion} + 10 \text{ billion}} = \frac{10 \text{ billion}}{20 \text{ billion}} = \boxed{\frac{1}{2}}$

after 1 year

debt ratio = $\frac{50}{100} - \frac{10}{100} = 0.4$

Debt ratio = $\frac{\text{Debt}}{\text{Debt + equity}} = \frac{40}{100}$

Debt = 40

Equity = 100 − 40 = 60 $\therefore \frac{D}{E} = \frac{40}{60}$

$$B_L = B_U * (1 + (1 - tax) * \frac{D}{E})$$

$$1.01 * (1 + (1 - 0.4) * \frac{40}{60})$$

$$\boxed{B_L = 1.41}$$

year 2 ٪30 بعد ما زاد ٪10 قلت كمان

new debt ratio $= \frac{40}{100} - \frac{10}{100} = \boxed{30\%} = 0.3$

$$\text{Debt ratio} = \frac{\text{Debt}}{\text{Debt + equity}} = \frac{30}{100}$$

debt = 30 equity = 70 $\frac{D}{E} = \frac{30}{70}$

$$B_L = B_U * (1 + (1 - t) * \frac{D}{E})$$

$$1.01 (1 + (1 - 0.4) * \frac{30}{70}) \quad \boxed{B_L = 1.27}$$

market value weights:

market value of C.S = market share price * no of Gommon stock

market value of P.S = market share price * no of P.S

في اغلب الدين كله bond كيبون.

market value of debt = ?

$$\text{market value of debt} = \frac{I}{r}\left(1 - \frac{1}{(1+r)^n}\right) + \frac{par}{(1+r)^n}$$

(the sum of time due * weigh of each amount of debt) = duration

amount of debt / Total debt

n ← بدل بنا نحط duration

r ← بدل pre tax cost of debt

weight * time due = مجموع القيم → duration

$$\text{market value wd} = \frac{\text{market value of debt}}{\text{MV of C.S} + \text{MV of P.S} + \text{M.V of debt}}$$

$$\text{market value wp} = \frac{\text{market value of P.S}}{\text{MV of C.S} + \text{MV of P.S} + \text{M.V of debt}}$$

$$\text{market value of ws} = \frac{\text{market value of C.s}}{\text{MV of C.s} + \text{M.V of P.s} + \text{M.V of debt}}$$

Problem 23:

Regression Beta = 0.75

B_u (average of Comparable firm) = 1.15

[a] D/E = 0.20 , tax = 40% , Beta based on the comparable firms? (Bottom up beta)

$$B_L = B_u * (1 + (1 - tax) * \frac{D}{E})$$

$$B_L = 1.15 * (1 + (1 - 0.4) * (0.2))$$

$$B_L = 1.288$$

[b] %95 confidence Interval Beta Regression?

$$\%95\ CI = [B \mp SE(b)(\text{Critical value})]$$

$$[0.75 \mp (0.5)(2)] = [-0.25 , 1.75]$$

$\Rightarrow$

[c] افضل Bottom up الاستخدام Beta more accurate

[d] Calculate WACC ? ← الحقيقي

Hurdle Rate

Treasury bond = %6.5

Tiffanes bond default spread = 1%

ERP = 5.5%

في حال وجود preferred stock

$WACC = w_d * K_d + w_s * K_s$

Cost of common equity $= R_F + b * ERP$

$= 6.5\% + (1.29)(5.5\%)$

$K_s = 13.59\%$

Cost of debt $= R_F$ + default spread.

$\%6.5 + \%1$

pre tax $K_d = \%7.5$

After tax $K_d = (1 - 0.4).\%7.5$

$K_d = 4.5\%$

$\frac{D}{E} = \frac{20}{100}$ Debt = 20, equity = 100

Total Capital = Debt + equity = 120

$w_d = \frac{20}{120}$

$w_s = \frac{100}{120}$

$WACC = \left(\frac{20}{120}\right)(\%4.5) + \left(\frac{100}{120}\right)(13.59\%)$

$WACC = 12.075\%$