

APPLIED CORPORATE FINANCE

Fourth Edition

Summarisation

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Risk Measurement And Hurdle Rates In Practice

- Hurdle Rate = **W**eighted **A**verage **C**ost of **C**apital (**WACC**)

$$\text{Assets} = \text{Liabilities} + \text{owners equity}$$

❖ Sources of Capital : مصادر رأس المال

1. Debt . الديون .
2. Common equity. . الأسهم العادية
3. preferred equity. . الأسهم المفضلة .

$$\text{WACC} = (\underbrace{W_d}_{\uparrow \text{Debt}} * \underbrace{K_d}_{\uparrow \text{Debt}}) + (\underbrace{W_s}_{\uparrow \text{Common}} * \underbrace{K_s}_{\uparrow \text{Common}}) + (\underbrace{W_p}_{\uparrow \text{preferred}} * \underbrace{K_p}_{\uparrow \text{preferred}})$$

W_d = wight of debt

K_d = cost of debt

W_s = wight of common equity.

K_s = cost of common equity

W_p = wight of preferred equity .

K_p = cost of preferred equity.

❖ Calculating Cost of Common equity: : حساب تكلفة الأسهم العادية

$$\text{CAPM} \rightarrow E(r) = R_f + B [E(r_m) - R_f]$$

- ❖ In order to be able to use CAPM to calculate cost of common equity will need the following inputs:

من أجل التمكن من استخدام CAPM لحساب تكلفة الأسهم العادية ، ستحتاج إلى المدخلات التالية:

- 1) Risk free rate (RFR) .
- 2) Beta (B) .
- 3) Expected market risk premium . Equity risk premium (ERP) .

✓ Actual return is equal to the expected return → No variance .

العائد الفعلي يساوي العائد المتوقع لا يوجد فرق (تباين) .

✓ Risk free rate → rate of return on a risk free asset.

معدل خالي من المخاطر ← معدل العائد على الأصول الخالية من المخاطر.

❖ for an asset to be risk free , two conditions must be:

لكي يكون الأصل خاليًا من المخاطر ، يجب أن يكون هناك شرطان:

1) **No default risk** → implies that the security has to be issued by the government . (Not all governments can be viewed as default free).

لا توجد مخاطر التخلف عن السداد ← يعني ضماناً أن الورقة المالية يجب أن تصدر عن الحكومة. (لا يمكن اعتبار جميع الحكومات على أنها خالية افتراضياً).

2) **No uncertainty about Reinvestment** → implies that it is a zero. Inflation IP Coupon security with the same maturity as the cash flow being analyzed.

لا يوجد عدم يقين بشأن إعادة الاستثمار ← يعني أنه أمان قسيمة صفري مع بعض الاستحقاق حيث يتم تحليل التدفق النقدي.

❖ Estimating risk free rate : تقدير المعدل الخالي من المخاطر

✓ RF → rate of return on long – term governmental bond.

معدل خالي من المخاطر ← معدل العائد على السندات الحكومية طويلة الأجل.

▪ Risk free rate should be in the Same Currency in which cash flows (from the assets) are estimated.

يجب أن يكون المعدل الخالي من المخاطر بنفس العملة التي يتم بها التدفقات النقدية

✓ تختلف RF من بلد الى أخرى باختلاف default spread or inflation

❖ Risk free rate: default free governments

$$RF = R^* + IP$$

R = rate of return .

IP = inflation premium .

- If bonds were issued by different governments that Aaa rated there will be differentiation the risk free rates due to expected inflation.

إذا تم إصدار سندات من قبل حكومات مختلفة صنفها Aaa ، فسيكون هناك تمايز في معدلات خالية من المخاطر بسبب التضخم المتوقع.

❖ Risk free rate: governments have default risk

معدل خالي من المخاطر: الحكومات لديها مخاطر التخلف عن السداد

- If the government issues long term bond in the local Currency than we should adjust the government bond rate by the estimated default spread to arrive at a risk less local Currency rate.

إذا أصدرت الحكومة سندات طويلة الأجل بالعملة المحلية ، فيجب علينا تعديل سعر السندات الحكومية بفارق التقصير المقدر للوصول إلى مخاطر أقل من سعر العملة المحلية.

- Some government have default risk. If these government issued , long term band in their local currency , we have to adjust the governments band rate by the estimated default spread to arrive at a risk lees , local currency.

بعض الحكومات لديها مخاطر التخلف عن السداد. إذا كانت هذه النطاقات طويلة الأجل الصادرة عن الحكومة بعملة المحلية ، يتعين علينا تعديل سعر النطاق الحكومي من خلال فرق السعر الافتراضي المقدر للوصول إلى سعر المخاطرة ، بالعملة المحلية.

EX : 10 year rupee band rate = 8.82% bond rate default spread 2.25%

$$\text{rupee risk free rate} = 8.82\% - 2.25\% = 6.57\%$$

- ✓ Risk free Rate ➔ No local currency government bonds :

معدل خالي من المخاطر: لا توجد سندات حكومية بالعملة المحلية :

❖ Two approaches to calculate RF:

طريقتان لحساب المعدل الخالي من المخاطر :

a) **Differential inflation approach:** we start with risk free rate in the US dollar and add the difference between the expected inflation for both countries.

نهج التضخم التفاضلي: نبدأ بالمعدل الخالي من المخاطر في الدولار الأمريكي ونضيف الفرق بين التضخم المتوقع لكلا البلدين.

Ex: 10 years Treasury bond rate = 2.75%

expected inflation Rate in India was 3% higher than the USA.

⇒ Risk free Indian Rupee = $3 + 2.75 = 5.75\%$.

EX : Rf Brazil ?? 10 years Treasury bond

Rf USA = 2.75%. | Inflation US higher than Brazil by 3%.

⇒ Rf Brazil = $2.75\% + 3\% = 5.75\%$

b) **Build up approach:** بناء النهج

$$\Rightarrow R_f = R + IP$$

R = real rate of return معدل العائد الحقيقي

IP = inflation premium علاوة التضخم

⇒ Rate on inflation index Treasures ,These treasuries offer a guaranteed real rate of return.

معدل ثروة مؤشر التضخم ، تقدم هذه الخزانات معدل عائد حقيقي مضمون.

❖ Measurement of the Risk premium : قياس علاوة المخاطر

$$\rightarrow E(r) = R_F + b [E(r_m) - R_F]$$

▪ The risk premium is the premium that investors demand for investing in an average risk investment , relative to the risk free rate
علاوة المخاطرة هي العلاوة التي يطلبها المستثمرون للاستثمار في استثمار متوسط المخاطر ، مقارنة بالمعدل الخالي من المخاطر.

▪ This premium should be : يجب ان يكون القسط كما يلي

1. Market risk premium (>0) . علاوة مخاطر السوق اقل من صفر .
2. market risk premium increases if the degree of the risk aversion of investors increases.

تزيد علاوة مخاطر السوق إذا زادت درجة نفور المستثمرين من المخاطرة

3. Market risk premium increases if the risk of the average risk investment increases.

يرتفع علاوة مخاطر السوق إذا زادت مخاطر متوسط الاستثمار في المخاطر.

❖ Approaches used to estimate the risk premium:

الأساليب المستخدمة لتقدير/حساب علاوة المخاطر:

1) Survey approach: نهج المسح

→ Limitations : محددات

1. There are no constraints on reasonability.

لا توجد قيود على المعقولية.

2. It used in calculating ERP reflects the past and not the future.

يستخدم في احتساب علاوة مخاطر حقوق الملكية يعكس الماضي وليس المستقبل.

3. Survey lends to be short-term.

يُقرض المسح على المدى القصير

2) Historical approach: النهج التاريخي

$$(E_m - R_f)$$

- Steps used to calculate ERP using the historical approach:

الخطوات المستخدمة لحساب علاوة مخاطر حقوق الملكية باستخدام النهج التاريخي:

- a) Determine the time period to be used.

تحديد الفترة الزمنية التي سيتم استخدامها

- b) choose the risk free security → long-term government bonds.

اختيار السندات الحكومية طويلة الأجل للأمن الخالي من المخاطر.

- c) Arithmetic and geometric average.

المتوسط الحسابي والهندسي.

Arithmetic return	Geometric return
1. Risk premium: Av. Market return. Av. Risk free .	1. terminal value: $(1+R_1)(1+R_2)\dots(1+R_n)$
2. arithmetic premiums for one year estimates of costs of equity.	2. geometric average = $(\text{terminal value})^{1/n-1}$

→ Limitations : محددات

- 1. It assume that the degree of risk aversion of investors has not change over time.

يفترض أن درجة نفور المستثمرين من المخاطرة لم تتغير بمرور الوقت.

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

يفترض أن مخاطر متوسط الاستثمار في المخاطر لم تتغير بمرور الوقت

EX:

Time	Value of market index	Annual market Return	Risk free Return
0	1005		
1	1100	9.45%	1.5
2	1200	9.1%	1.8
3	1150	-4.167%	1.2
4	1200	4.35%	2
5	1300	34%	1.5
Average	→	5.41%	1.6%

i. **Arithmetic return** → **Historical equity premium = AV.Market return – AV.Risk free**
 $= 5.41\% - 1.6 = 3.81\%$

ii. **Geometric return**

$$\text{terminal value} = (1+R_1)(1+R_2)(1+R_3) \dots (1+R_n)$$

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

▪ **Market return :**

$$\text{A. terminal value} = (1+0.0945)(1+0.091)(-0.0416)(1+0.0435)(1+0.083) = 1.293$$

$$\text{B. geometric average} = (1.293)^{1/5} - 1 = 0.053 = 5.3\%$$

▪ **Risk free :**

$$\text{A. Terminal value} = (1+0.015)(1+0.018)(1+0.012)(1+0.02)(1+0.015) = 1.082$$

$$\text{B. geometric average} = (1.082)^{1/5} - 1 = 0.016 = 1.6\%$$

Market risk premium = Arithmetic AV.market return - Arithmetic AV.risk free

$$\text{MRP} = 5.3\% - 1.6\% = 3.7\%$$

- ✓ A modified ERP in emerging markets

علاوة مخاطر الأسهم المعدلة في الأسواق الناشئة

$$ERP = ERP_{\text{for a}} + \text{Country premium.}$$

Using the historical approach. mature market

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

لتقدير قسط البلد ، يمكننا استخدام النهج التالي:

A. Use the Country bond default spread

استخدام فرق السعر الافتراضي لسندات الدولة

The country's bond default spread will be used as a measure of the country premium.

سيتم استخدام فارق السندات الافتراضي للدولة كمقياس لقسط البلد.

$$ERP_x = ERP_{\text{us}} + \text{default spread}_x$$

Examples:

$$ERP_{\text{us}} = 4.2\%$$

$$\text{default spread India } \$2.25\% \quad | \quad \text{Brazil} = 2\%$$

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

$$ERP_{\text{India}} ?? \rightarrow ERP_{\text{India}} = 4.2\% + 2.25\% = 6.45\%$$

B. Use the Relative standard deviation

استخدام الانحراف المعياري النسبي

$$ERP_{\text{in Emerging market}} = ERP_{\text{in mature market}} * SD_{\text{emerging market}} * \text{Relative standard deviation}$$

$$\rightarrow ERP = ERP * SD_{\text{emerging market}} / SD_{\text{mature market}}$$

Example:

$$ERP_{\text{us}} = 4.2\%$$

$$SD_{\text{us}} = 15\%$$

$$SD_{\text{Brazil}} = 21\%$$

$$ERP_{\text{Brazil}} = ?$$

$$\begin{aligned}
 \text{ERP}_{\text{Brazil}} &= \text{ERP}_{\text{us}} * \text{SD Brazil} / \text{SD us} \\
 &= 4.2\% * 21\% / 15\% = 5.88\% \\
 \text{Country premium} &= \text{ERP}_{\text{Brazil}} - \text{ERP}_{\text{us}} . \\
 &= 5.88\% - 4.2\% = 1.68\%
 \end{aligned}$$

c) use the default spread + relative standard deviation .

استخدم السبريد الافتراضي + الانحراف المعياري النسبي.

$$\text{ERP} = \text{ERP} + (\text{default spread emerging} * \text{SD equity emerging} / \text{SD bonds emerging})$$

Example:

$$\text{ERP us} = 4.2\%$$

$$\text{SD equity Brazil} = 21\%$$

$$\text{SD bond Brazil} = 14\%$$

$$\text{Default Brazil} = 2\%$$

ERP Brazil ?

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

$$\begin{aligned}
 \text{ERP Brazil} &= \text{ERP}_{\text{us}} + \text{Country premium} \\
 &= 4.2\% + 3\% = 7.2\%
 \end{aligned}$$

3) Implied ERP approach: منهج علاوة مخاطر حقوق الملكية الضمنية

ما يبجي فالامتحانات Page 102

Standard and poor 500 index = 1,756.54

Total annual cash flow 82.35

A) $G_1 = 5.59\%$ for the first five years.

B) From the end of year 5 and there after $G_2 = R_F = 2.55\%$.

ERP = ??

$$\text{ERP} = \text{RM} - \text{RF}$$

Follow ➡

⇒ **CF / r - g**

$$CF_1 = CF_0 (1+g_1) = 82,35 (1+5.59\%) = 86.96$$

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

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

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

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

$$CF_6 = CF_5 (1+g_2) = 108.1 (1 + 2.55\%) = 110.86$$

$$PV = FV / (1+r)^2$$

$$1756.54 = \frac{86.96}{(1+r)} + \frac{91.82}{(1+r)^2} + \frac{96.95}{(1+r)^3} + \frac{102.38}{(1+r)^4} + \frac{108.10}{(1+r)^5} + \frac{110.86}{(r - 0.0255)(1+r)^5}$$

From excl → Required return on equity (RM) = 8.04

Solving for the required return and the implied premium with the higher cash flows:

Implied equity risk premium = Required return on equity – Risk-free rate

$$ERP = 8.04\% - 2.55\% = 5.49\%$$

❖ Three approaches can be used to estimate beta:

❖ يمكن استخدام ثلاث طرق لتقدير بيتا :

1. Regression beta .
2. Bottom up beta.
3. Accounting beta.

1) Regression beta:

⇒ Regression : a tool used by connections الانحدار أداة تستخدمها التوصيلات

❖ **Regression Analysis :** تحليل الانحدار

Simple regression analysis describing a relationship between a single dependent variable (Y) and a Single independent variable (X) .

انحدار بسيط : تحليل يصف العلاقة بين متغير تابع واحد (Y) ومتغير مستقل واحد (X).

Multiple regression: Analysis describing relationship between a single(Y) and a number of (X's).

الانحدار المتعدد: تحليل يصف العلاقة بين Y واحد وعدد من X.

❖ Steps to estimate regression beta: خطوات تقدير الانحدار التجريبي

- i. Determine the time period and the Frequency of the data. frequency of date is preferred to be monthly.
frequency of date = monthly.

تحديد الفترة الزمنية وتكرار البيانات. يُفضل أن يكون تكرار التاريخ شهريًا. تردد الشهر = شهريًا

- ii. get the stock price churning the fine to period determined and calculate the stock return.

$$R_s = P_t - P_{t-1} + CF / P_{t-1}$$

الحصول على سعر المكس المتماوج للغرامة حتى الفترة المحددة وحساب عائد المخزون.

- iii. get the market index during the time period determined and calculate the market return.

$$R_m = P_t - P_{t-1} + C_f / P_{t-1}$$

الحصول على مؤشر السوق خلال الفترة الزمنية المحددة وحساب عائد السوق.

- iv. Regress stock return on market return.

تراجع عائد الأسهم عند عائد السوق.

$$Y = MX + C$$

$MX = \text{slope}$

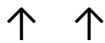
$C = y - \text{intercept}$

$$\text{ERP Disney} = 82.01\% \times 5.5\% = 11.64\% \times 6.72\% + 6.02\% \times 7.27\% + 0.33\% \times 9.44\% = 5.76\%$$

❖ To estimate regression beta:

1. Decide on the estimation period. تحديد فترة التقدير
2. frequency of data monthly تواتر البيانات الشهرية
3. Estimate return on the security $R = P_t - P_{t-1} + D / P_{t-1}$
4. choose a market index and estimate market return.
5. regress security return on market return.

$$K_e = R_F + b * ERP$$



Regression beta .

Survey approach

Bottom up beta.

Historical approach

Accounting beta.

Implied ERP approach

$$R_j = a + B * RM$$

R_j = stock return

a = y – intercept

B = slope regression beta

RM = market return

- Regression parameters are always estimated with error, the error is captured in the standard error of beta estimated.

• يتم تقدير معاملات الانحدار دائماً بالخطأ ، ويتم تسجيل الخطأ في الخطأ القياسي للبيتا المقدرة.

❖ Intervals :

$$[\text{estimate beta} - 2 * \text{standard error (beta)} , \text{estimate beta} + 2 * \text{standard error (beta)}]$$

Ex : Amzon returns = 0.013 + 1.13 + S&P500 return.

(0.008) (0.184)

$$\checkmark 95\% \text{ Interval} = (\text{beta} - 2 * \text{SE beta} , \text{beta} + 2 * \text{SE beta})$$

Critical value = 2

$$= (1.13 - 2 * 0.184 , 1.13 + 2 * 0.184)$$

$$= (0.765 , 1.503)$$

⇒ we are 95% confidence that beta-1.13 lies between the interval (0.765, 1.503)

$$\checkmark 67\% \text{ Interval} = (\text{beta} - 1 * \text{SE beta} , \text{beta} + 1 * \text{SE beta})$$

Critical value = 1

$$= (1.13 - 1 * 0.184 , 1.13 + 1 * 0.184)$$

$$= (0.946 , 1.314)$$

⇒ we are 67% confidence that beta - 113 lies between the interval [0.946, 1.314] .

$$\Rightarrow R_j = a + B \cdot R_M$$

↑ market model

$$E(r_s) = R_f + b [E(r_m) - R_f]$$

$$E(r_s) = R_f + b \cdot E(r_m) - b \cdot R_f$$

$$E(r_s) = R_f + b \cdot R_f + b \cdot E(r_m)$$

$$E(r_s) = \underbrace{R_f (1-b)}_{\uparrow \text{intercept}} + \underbrace{b}_{\uparrow \text{slope}} \cdot E(r_m) \quad \text{Theory}$$

❖ Jensen's alpha $\rightarrow a - R_f (1-b)$

↑ intercept From the market model.

- If $a > R_f (1-b) \rightarrow$ the stock did better than expected.
 $\Rightarrow$ (positive Jensen's alpha) .
- If $a < R_f (1-b) \rightarrow$ The stock did worse than expected.
 $\Rightarrow$ (negative Jensen's alpha).
- If $a = R_f (1-b) \rightarrow$ The stock did as expected.
 $\Rightarrow$ (Zero Jensen's alpha).

Ex: Analyzing Disney's performance

Intercept = 0.712% $\rightarrow$ based on monthly returns.

Average Annualized T. Bills rate = 0.5%

monthly risk free rate: $0.5\% / 12 = 0.042\%$ | Beta = 1.25

$$\text{Jensen's alpha} = a - R_f (1-b)$$

$$= 0.712\% - 0.942\% (1-1.25)$$

$$= 0.712 - (- 0.0105\%)$$

$$= 0.723\% \downarrow$$

$\Rightarrow$ Will positive Jensen's alpha where $a > R_f (1-b)$. did better then expected by 0.723%.

2) **Bottom up beta** (fundamental beta)

⇒ Determinants of beta . محددات بيتا .

1. Type of product . نوع المنتج .
2. Degree of operating leverage (higher leverage) . درجة الرافعة التشغيلية .
3. Degree of financial leverage . درجة الرافعة المالية .

⇒ **Type of product :**

- i. Firms which sell more discretionary or luxury product will have higher betas.

الشركات التي تباع المزيد من المنتجات التقديرية أو الفاخرة سيكون لديها إصدارات تجريبية أعلى.

- ii. Firms which sell more non-discretionary or necessary product will have lower betas.

الشركات التي تباع المزيد من المنتجات غير التقديرية أو الضرورية سيكون لديها إصدارات تجريبية أقل.

⇒ **Degree of operating leverages / Operating leverage effects**

- The use of fixed operating costs to magnify the effect of the change in sales on the firm's EBIT.

- استخدام تكاليف التشغيل الثابتة لتضخيم تأثير التغيير في المبيعات على العائد قبل احتساب الفوائد والضرائب للشركة.

✓ **Fixed Costs measure = Fixed costs / Variable Costs**

↳ measures the relationship between fixed and variable Costs.

يقيس العلاقة بين التكاليف الثابتة والمتغيرة.

- Degree of operating leverage (EBIT variability measured).

- درجة الرافعة المالية التشغيلية (قياس التغير في الأرباح قبل احتساب الفوائد والضرائب).

✓ **DOL = %ΔEBIT / %ΔRevenues.**

↳ measures how EBIT changes as revenues change.

يقيس كيف يتغير العائد قبل احتساب الفوائد والضرائب مع تغير الإيرادات.

EBIT = Earnings Before Interest and Taxes . الأرباح قبل الفوائد والضرائب .

DOL = Degree of operating leverage . درجة الرافعة التشغيلية .

Example:

	A (\$)	B (\$)	A	B
Revenues	\$100	\$100	\$120	\$120
Fixed costs	\$10	\$80	\$10	\$80
Variable Costs	\$80	\$10	\$96	\$12
EBIT	\$10	\$10	\$14	\$28

- If sales increase 20% , EBIT???
- a. DOL (A) ?? $\rightarrow$ Revenue(A) = $100 + (100 \times 0.2) = \mathbf{\$120}$.
- b. DOL (B) ?? $\rightarrow$ Revenue(B) = $100 + (100 \times 0.2) = \mathbf{\$120}$.

- Fixed costs remain the same. . تظل التكاليف ثابتة كما هي .

- Variable Costs $\downarrow$ التكاليف المتغيرة

a. $V.C_A = 80 + (80 \times 0.2) = \mathbf{\$96}$

b. $V.C_B = 10 + (10 \times 0.2) = \mathbf{\$12}$

• $EBIT_{(A)} = \text{Revenue} - F.C - V.C$
 $= 120 - 10 - 96 = \mathbf{\$14}$

• $EBIT_{(B)} = \text{Revenue} - F.C - V.C$
 $= 120 - 80 - 12 = \mathbf{\$28}$

$\Rightarrow \% \Delta \text{ in sales} = 20\% \mid \% \Delta \text{ in EBIT} = ??$
 $= 14 - 10 / 10 = \mathbf{0.4} \rightarrow 0.4 \times 100 = \mathbf{40}$

$\Rightarrow \% \Delta \text{ in sales} = 20\% \mid \% \Delta \text{ in EBIT} = ??$
 $= 28 - 10 / 10 = \mathbf{1.8} \rightarrow 1.8 \times 100 = \mathbf{180}$

$DOL (A) = \% \Delta EBIT(A) / \% \Delta \text{Revenues}(A) \rightarrow 40\% / 20\% = 2\%$

$DOL (B) = \% \Delta EBIT(B) / \% \Delta \text{Revenues}(B) \rightarrow 180\% / 20\% = 9\%$

$\rightarrow$ The higher the degree of operating leverage, the higher the risk $\rightarrow$ the higher the beta.

كلما زادت درجة الرافعة المالية التشغيلية ، زادت المخاطرة $\leftarrow$ كلما ارتفعت قيمة بيتا .

❖ Degree of financial leverage :

- Financial leverage : The use of fixed cost financing (preferred, debt) to magnify the effect of the change in EBIT on the firm's Earnings per share (EPS) .

الرافعة المالية : استخدام تمويل التكلفة الثابتة (المفضل ، الدين) لتضخيم تأثير التغيير في العائد قبل احتساب الفائدة والضريبة على أرباح الشركة لكل مادة صخرية (EPS).

✓ Degree of financial leverage (DFL) = $\% \Delta EPS / \% \Delta EBIT$.

⇒ The higher the financial leverage, the higher the risk the higher the beta.

كلما زادت الرافعة المالية ، زادت المخاطرة كلما ارتفعت النسخة التجريبية

- regression beta = Beta leverage = Equity beta: shows the impact of three determinants of beta which are type of product, degree of operating, leverage and of financial leverage.

الانحدار بيتا = الرافعة المالية التجريبية = حقوق الملكية بيتا: يوضح تأثير ثلاثة محددات بيتا وهي نوع المنتج ودرجة التشغيل والرافعة المالية والرافعة المالية.

- Beta un-leverage = asset beta shows the impact of two determinants of beta which are type of product and degree of operating leverage.

بيتا غير معزز = الأصول التجريبية تظهر تأثير اثنين من محددات بيتا وهما نوع المنتج ودرجة الرافعة التشغيلية.

$$\begin{array}{c} \downarrow \text{beta unlevered.} \quad \downarrow \text{debt} \\ \checkmark \text{ BL} = \text{Bu} (1 + [1 - t] \text{D/E}) \\ \uparrow \text{beta levered.} \quad \uparrow \text{tax.} \quad \uparrow \text{equity} \end{array}$$

- BL - Bu if and only if D/E ratio = 0

⇒ حيث لا يوجد نفوذ مالي . where there is no financial leverage .

Ex : regression beta for Disney is 1.25.

The average D/E ratio is 19.44%

marginal tax rate is 36.14.

Bu = ??

$$B_l = B_u (1 + [1 - t] D/E)$$

$$1.25 = B_u (1 + [1 - 26.1\%] 19.44\%)$$

$$B_u = 1.25 / 1.24 = 1.11$$

⇒ The more we depend on leverage, the beta goes. This higher and higher.

كلما زاد اعتمادنا على الرافعة المالية ، تذهب النسبة التجريبية. هذا أعلى وأعلى.

✓ **Debt to Capital ratio = Debt / debt + equity**

✓ **Debt to Equity ratio = Debt / Equity**

☒ Effect of financial leverage on beta: تأثير الرافعة المالية على بيتا

Ex: Disney → Debt to Capital ratio = 10%

unlevered beta-1.11

tax rate = 36.11

BL = ??

$$\text{Debt / capital} = \text{Debt / debt + equity} \rightarrow 10 / 100$$

$$\text{Debt} = 10$$

$$\text{Debt} + \text{equity} = 100$$

$$10 + \text{Equity} = 100 \rightarrow \text{Equity} = 90$$

$$B_l = 1.11 (1 + [1 - 36.11\%] 10/90)$$

$$B_l = 1.11 (1 + 0.071)$$

$$B_l = 1.11 * 1.071 = 1.19$$

⇒ The higher the debt to capital ratio, the higher the financial leverage the higher the risk and the higher the beta.

كلما ارتفعت نسبة الدين إلى رأس المال ، كلما زادت الرافعة المالية زادت المخاطر وزادت القيمة التجريبية.

❖ Calculating beta for a combined firm (3 scenarios)

Ex :

Disney : معطيات الشركة

$$BL = 1,15$$

$$\text{Debt} = \$3,186 \text{ million}$$

$$\text{Equity} = \$31,100 \text{ million}$$

$$\text{Firm value} = D + E = 3,186 + 31,100 = 34,286 \text{ million \$}$$

$$\text{Tax rate} = 36,1\%$$

$$D/E \text{ ratio} = 3,186M / 31,100M = 10\% = 0,1$$

Capital Cities : معطيات الشركة

$$BL = 0,95$$

$$\text{Debt} = 615 \text{ million \$}$$

$$\text{equity} = 18,500 \text{ million \$}$$

$$\text{Firm value} = D + E = 615M + 18,500M = 19,115M \$$$

$$\text{Tax rate} = 36,1\%$$

$$D/E \text{ ratio} = 615M / 18,500M = 3\%$$

Step 1 : Calculate unlevered beta for each company :

حساب الإصدار التجريبي غير معزز لكل شركة.

Disney :

$$BL = Bu (1 + \{1-T\} D/E)$$

$$1,15 = Bu (1 + \{1 - 0,361\} 10\%)$$

$$1,15 = Bu * 1,0639$$

نقسم على (١.٠٦٣٩) من الطرفين

$$\Rightarrow Bu = 1,08$$

Capital Cities :

$$BL = Bu (1 + \{1-T\} D/E)$$

$$0,95 = Bu (1 + \{1 - 0,361\} 10\%)$$

$$0,95 = Bu * 1,01917$$

نقسم على (١.٠١٩١٧) من الطرفين.

$$\Rightarrow Bu = 0,93$$

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

حساب بيتا غير المقصد للشركة المندمجة (المتوسط المرجح)

$$B_u \text{ Disney} = 1,08$$

$$B_u \text{ Capital Cities} = 0,93$$

$$\Rightarrow W(\text{Disney}) = \text{value of Disney} / \text{value of combined firm} \\ = 34,286\text{M} / 53,401\text{M} = 0,64$$

$$\Rightarrow \text{Value combined firm} = 34,286\text{M} + 19,115\text{M} = 53,401 \text{ million.}$$

$$\Rightarrow W(\text{Disney}) = \text{value of Disney} / \text{value of combined firm} \\ = 19,115\text{M} / 53,401\text{M} = 0,36$$

$$B_u \text{ for combined firm} = W * B_u$$

↓ each company ↑ each company

$$B_u = (0,64 * 1,08) + (0,36 * 0,93) = \mathbf{1.02}$$

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

حساب بيتا الرافعة للشركة المندمجة في (٣ سيناريوهات)

i. If Disney bought capital cities will all equity:

$$\text{Disney : } D = 3,186\text{M} \quad | \quad E = 31,100\text{M} \Rightarrow D + E = \$34,286\text{M}$$

$$\text{Capital cities : } D = 615\text{M} \quad | \quad E = 18,500\text{M} \Rightarrow D + E = \$19,115\text{M}$$

Combined firms (Disney + Capital Cities).

$$\text{Debt} = 3,186 + 615 = \mathbf{3,801}$$

$$\text{Equity} = 31,100 + 18,500 = \mathbf{49,600}$$

نجمع ديون الشركتين مع بعض.

نجمع حقوق الملكية ل الشركتين مع بعض

$$B_L \text{ Combined} = B_u (1 + \{1 - T\} D/E)$$

$$B_L = 1.02 (1 + \{1 - 0,36\} 3,801 / 49,600) = \mathbf{1,07}$$

ii. If Disney bought Capital Cities with all debt:

Combined firms (Disney + Capital Cities).

$$\text{Debt} = 3186 + 615 + 18500 = 22301$$

$$\text{Equity} = 31100$$

$$\text{Bl Combined} = \text{Bu} (1 + \{1-T\} D/E)$$

$$\text{BL} = 1,023 (1 + \{1- 36,1\} 22301/3110) = 1.49$$

iii. If Disney bought capital Cities with mix of debt and equity :

⇒ Assume → Debt = 10000 million and the rest is equity.

Combined firms (Disney + Capital Cities).

$$\text{Debt} = 3186 + 615 + 10000 = 13801$$

$$\text{Equity} = 31100 + 8500 = 39600$$

$$\text{Bl Combined} = \text{Bu} (1 + \{1-T\} D/E)$$

$$\text{Bl} = 1,023 (1 + \{1-36,1\} 13801/39600) = 1,25$$

❖ In order to Calculate Bottom-up beta we need to :

لحساب بيتا التصاعدي ، نحتاج إلى:

1) **Determine the firm's business divisions.** Ex : media ,parks , consumer products.

تحديد التقسيمات التجارية للشركة. على سبيل المثال: وسائل الإعلام والمتنزهات والمنتجات الاستهلاكية

2) for each business division we should do the following steps:

يجب أن نقوم بالخطوات التالية لكل قسم أعمال:

a. Get comparable firms. The more the firms the better.

احصل على شركات مماثلة. كلما زاد عدد الشركات كلما كان ذلك أفضل.

b. get beta levered for each of the comparable firms.

الاستفادة من الإصدار التجريبي لكل من الشركات المماثلة.

c. Calculate the average mean and the median of the levered beta .

احسب متوسط ووسيط بيتا الرافع.

d. Collect data on equity and debt for each comparable firms.

اجمع بيانات عن حقوق الملكية والديون لكل شركة قابلة للمقارنة.

e. Calculate Debt to equity ratio for each comparable firms.

احسب نسبة الدين إلى حقوق الملكية لكل شركة قابلة للمقارنة.

f. Calculate the mean or the median of the debt to equity ratio.

احسب متوسط أو متوسط نسبة الدين إلى حقوق الملكية.

g. Calculate the average tax rate or the median .

احسب متوسط معدل الضريبة أو المتوسط.

h. Unlever the beta ↴ رفع مستوى بيتا.

$$B_L = B_U (1 + [1-t] D/E)$$

⇒ we can use either the mean or the median A but the median is most preferred to be used.

يمكننا استخدام إما الوسيط أو الوسيط a ولكن الوسيط هو الأكثر تفضيلاً لاستخدامه.

Ex: studio entertainment :

BL median = 1,24

tax rate median = 0,4

D/E ratio median = 27,06%

$$B_L = B_U (1 + [1-t] D/E)$$

$$1.24 = B_U (1 + [1-0,4] 27,06\%)$$

$$B_U = 1.06$$

3) Calculate beta unlevered for all business operations :

حساب بيتا غير المعزز لجميع العمليات التجارية.

↓ each division

$$B_U \text{ all business operations} = W * B_U = \text{weight average}$$

↑ each division

Weight for each division = revenue from each division / Total revenue

↕ Or ↕

Weight for each division = value of each division / Total firm value

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

تقدير الاستخدام التجريبي لجميع العمليات التجارية وتكلفة حقوق الملكية.

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

تقدير بيتا المعزز لكل قسم. وتكلفة حقوق الملكية لكل قسم.

$$\text{Cost of equity} = R_f + B \cdot \text{ERP}$$

❖ Calculating bottom up beta for an unlisted firm private :

1. **get comparable firms.** الحصول على شركات مماثلة.
2. **get beta levered for each of the comparable firms, and calculate the mean. or the median.**

الاستفادة من الإصدار التجريبي لكل من الشركات المماثلة ، وحساب المتوسط. أو الوسيط.

3. **Get Debt to equity ratio for each of the comparable firms and Calculate the average or median of Debt to equity ratio .**

احصل على نسبة الدين إلى حقوق الملكية لكل من الشركات المماثلة وحساب متوسط أو متوسط نسبة الدين إلى حقوق الملكية.

4. **Calculate the average of the median of the marginal tax rate.**

احسب متوسط متوسط معدل الضريبة الهامشي.

5. **Unlever the beta .**
6. **Calculate beta levered for the private company of interest using the median D/E ratio for the whole industry the company operates in Calculating bottom up beta for an unkind firms.**

$$B_l = B_u (1 + [1 - t] D/E)$$

حساب بيتا الرافعة للشركة الخاصة ذات الفائدة باستخدام متوسط نسبة الدين إلى حقوق الملكية للصناعة بأكملها التي تعمل بها الشركة في حساب بيتا من أسفل إلى أعلى للشركات غير اللطيفة.

- **Beta measures the risk added to a diversified portfolio. But the Owners of most private (unlisted) firms ain't diversified. Therefore using beta to arrive at a cost of equity will:**

بيتا يقيس المخاطر المضافة إلى محفظة متنوعة. لكن مالكي معظم الشركات الخاصة (غير المدرجة) ليسوا متنوعين. لذلك فإن استخدام الإصدار التجريبي للوصول إلى تكلفة حقوق الملكية سيؤدي إلى:

1. **Underestimate the Cost of equity for the private firm.**

التقليل من تكلفة حقوق الملكية للشركة الخاصة

2. **Overestimate the Cost of equity for the private firm .**

بالغ في تقدير تكلفة حقوق الملكية للشركة الخاصة.

3. **Could Over or under the Cost of equity for the private firm.**

يمكن أن تزيد أو تحت تكلفة حقوق الملكية للشركة الخاصة.

⇒ So we need to adjust the beta to reflect total risk rather Than market risk.

$$\text{Adjusted beta} = \text{Market Beta} / \sqrt{R^2}$$

لذلك نحن بحاجة إلى تعديل الإصدار التجريبي لتعكس إجمالي المخاطر بدلاً من مخاطر السوق.

بيتا المعدل = سوق بيتا / جذر R تربيع.

$$B_l \text{ median} = 0,81$$

$$R^2 \text{ median} = 0,26$$

$$\text{Tax ratio median} = 0,4$$

$$D/E \text{ ratio median} = 0,2141$$

$$B_l = B_u (1 + [1-t] D/E)$$

$$0,81 = B_u (1 + [1-0,4] 0,2141) \mid B_l = 0,72$$

$$B_l = 0,72 (1 + [1-0,4] 0,2141) \mid B_l = 0,81$$

$$\Rightarrow B / \sqrt{R^2} = 0,81 / \sqrt{0,26}$$

$$WACC = W_e * K_e + K_d * K_d + W_p * K_p$$

↗

$$K_e = R_f + b * ERP$$

❖ **Calculating cost of debt: حساب تكلفة الدين**

✓ **If the firm issued bonds they were liquid and traded then:**

✓ إذا أصدرت الشركة نطاقات كانت سائلة وتم تداولها بعد ذلك:

A. Per-tax of debt = YTM (yield to maturity) .

⇒ **after tax cost of debt = per tax cost of debt*(1-tax)**

بعد تكلفة الضريبة للديون = تكلفة كل ضريبة للدين * (١ - ضريبة).

✓ If the firm issued bonds that are illiquid, then:

✓ إذا أصدرت الشركة نطاقات غير سائلة ثم:

→ Pre-tax Cost of Debt = R_f + default spread.

B. look at the issuer's rating (rating done by credit rating agencies)

انظر إلى تصنيف المُصدر (التصنيف الذي قامت به وكالات التصنيف الائتماني)

Pre tax cost of debt = R_f + default spread (associated with the firm's rating)

تكلفة الدين قبل الضريبة = خالية من المخاطر + انتشار التقصير (المرتبط بتصنيف الشركة)

⇒ After tax cost of debt = per tax cost of debt $(1-t)$.

C. If the firm has not issued bonds and is not rated then:

إذا لم تصدر الشركة سندات ولم يتم تصنيفها :

1. Look at the last loan received by the firm , the interest rate on the loan would be the pre-tax cost of debt .

انظر إلى آخر قرض حصلت عليه الشركة ، فإن سعر الفائدة على القرض سيكون تكلفة الدين قبل خصم الضرائب.

2. Do a synthetic rating for the firm (issuer) : (المُصدر)
per tax cost of debt = R_f + default spread (associated with the rating done).

⇒ In order to do the synthetic rating. should calculate the following ratio:

من أجل القيام بالتصنيف التركيبي. يجب أن تحسب النسبة التالية:

Times interest earned ratio = $EBIT / \text{interest coverage ratio}$

❖ **Calculating cost of preferred stock: حساب تكلفة المخزون المفضل**

Expected cash flow = $D_0 = D_1 = D_2 \dots D$

Price of preferred = PV of expected cash flow

Price = dividends / required rate of return | $P = D / R \rightarrow R = RP$

Cost of preferred stock = Dividends / present value.

❖ **Weights:** الأوزان

1. Book value weights. أوزان القيمة الدفترية
2. Market value weights. أوزان القيمة السوقية

❖ **Calculating book value weights:** حساب اوزان القيمة الدفترية

- $W_e = \text{common equity} / \text{debt} + \text{preferred equity} + \text{common equity}$
- $W_d = \text{Debt} / \text{Debt} + \text{Preferred Equity} + \text{Common Equity}$
- $W_p = \text{preferred equity} / \text{Debt} + \text{preferred equity} + \text{common equity}$

❖ **Calculating Market value weights.** حساب أوزان القيمة السوقية

- $W_e = \text{market value common stock} / \text{market value of debt} + \text{market value of preferred stock} + \text{market value of common stock}$
- $\text{Market of common stock} = \text{market share price} * \text{number of common stocks}$.
- $\text{Market value preferred stock} = \text{market price} * \text{number of preferred stocks}$.

❖ **Calculating Market value of debt :** حساب القيمة السوقية للديون

- $\text{Market value of debt} = I / r (1 - 1 / \{1+r\}^n) + \text{par} / (1+r)^n$
 I = interest payment
 R = per tax cost of debt
 N = Duration
- $\text{Duration} = \text{Time due} * \text{Weight of each amount of Debt}$
- $\text{Weight of each amount of Debt} = \text{amount of Debt} / \text{Total Debt}$

The end ♥

Question on chapter 4

Question 1 :

Genuine Care is a company that offers health care services. The company has **\$150 million in interest-bearing debt** (in book value and market value terms). **The firm has 26 million shares trading at \$ 10 a share**, and the **unlevered beta** of comparable firms in the health care business is **0.9**. The firm has a current rating of B, with a **default spread of 0.05** over the risk-free rate. The **risk-free rate is 0.035**, the **equity risk premium is 0.07** and the corporate **tax rate is 40%**.

- 1) What is the levered beta for the firm?

$$BL = BU(1 + [1 - \text{tax}]D/E)$$

$$\text{Levered beta} = 0.9 * [1 + (1 - 0.4)*(150/260)] = 1.21$$

- 2) Estimate the cost of equity for the firm.

$$\text{Cost of equity (Re)} = R_f + \text{Levered beta} * \text{ERP}$$

$$= 0.035 + 1.21 * 0.07 = 0.119$$

- 3) Estimate the before-tax cost of debt for the firm.

$$\text{Before tax cost of debt} = R_f + \text{Default spread}$$

$$= 3.5\% + 5\% = 8.5\%$$

- 4) Estimate the after-tax cost of debt for the firm.

$$\text{After tax cost of debt (Rd)} = \text{Before tax} * (1 - \text{Tax rate})$$

$$= 8.5\% * (1 - 0.4) = 5.1\%$$

- 5) What is the market value weight of debt?

$$\text{Weight of debt (Wd)} = D / (D + E)$$

$$= 150 / (150 + 260) = 0.3659$$

- 6) What is the market value weight of equity?

$$\text{Weight of Equity (We)} = E / (D + E)$$

$$= 260 / (150 + 260) = 0.6341$$

- 7) Estimate the cost of capital for the firm.

$$\text{Cost of capital} = \text{WACC} = W_d R_d + W_e R_e$$

$$= (0.3659)(5.1\%) + (0.6341)(11.98\%) = 9.46\%$$

Question 2 :

Question 15 page 158

You have run a **regression of monthly returns** on Am- gen, a large biotechnology firm, against monthly returns on the S&P 500 Index, and come up with the following output:

$$R_{\text{stock}} = 3.28\% + \underset{\substack{\uparrow a = \text{intercept}}}{1.65} \underset{\substack{\downarrow \text{beta}}}{R_{\text{Market}}} \quad R^2 = 0.20$$

The current one-year **Treasury bill rate is 4.8%** and the current thirty-year **bond rate is 6.4%**. The firm has **265 million shares outstanding, selling for \$30 per share.**

- What is the expected return on this stock over the **next year**?
- Would your expected return estimate change if the purpose was to get a discount rate to analyze a **thirty-year** capital budgeting project?
- An analyst has estimated correctly that the stock did **51.10% better than expected annually during the period of the regression**. Can you **estimate the annualized risk-free** rate that she used for her estimate?
- The firm has a **debt-to-equity ratio of 3%** and faces a **tax rate of 40%**. It is planning to issue **\$2 billion** in new debt and **acquire a new business** for that amount, with the same risk level as the firm's existing business. What will the beta be after the acquisition?

معطيات :

$$R_{\text{stock}} = 3.28\% + 1.65 R_{\text{Market}} \quad R^2 = 0.20$$

Treasury bill rate = 4.8%

Treasury bond rate = 6.4%

Tax = 40%

A) $E(r) = ??$

$$E(r) = R_f + B * ERP$$

$$E(r) = 4.8 + 1.65 * 8.76 = 19.25\%$$

ملاحظات مهمة : ❖

- ✓ R_f هي نفسها Treasury bill / Treasury bond .
- ✓ نستخدم Treasury bond عندما يُذكر في السؤال long term او سنوات او فترات طويلة الاجل.
- ✓ نستخدم Treasury bill عندما يُذكر في السؤال short term او سنوات او فترات قصيرة الاجل .
- ✓ ERP ل long term تساوي 5.5% .
- ✓ ERP ل short term تساوي 8.67% .

B) $E(r) = RF + B * ERP \rightarrow$ long term
 $E(r) = 6.4 + 1.65 * 5.5 = 15.47\%$

إذا لم تذكر ERP في السؤال ، تساوي 5.5

C) 51.10% better than expected annually

Annualized Rf = ??

أولاً : نحول من سنوي الى شهري باستخدام القانون $\leftarrow (1+R)^{1/12} - 1$

Monthly Jensens = $(1 + 51.1)^{1/12} - 1 = 3.5\%$

Monthly Jensens alpha = 3.5%

Jensen alpha = $a - (1 - B) * RF$

ثانياً : نطبق على القانون

$3.5\% = 3.28\% - (1 - 1.65) * Rf$

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

$0.035 - 0.0328 = 0.65Rf$

$0.022 = 0.65Rf$

نقسم من الطرفين على 0.65

Monthly Rf = 0.0338%

ثالثاً : نحول من شهري ل سنوي باستخدام القانون $\leftarrow (1+R)^{12} - 1$

Annualized Rf = $(1 + 0.0338)^{12} - 1 = 0.49\%$

D) D / E = 0.03

Tax rate = 40%

$BL = Bu (1 + (1 - t) D/E)$

$1.65 = Bu (1 + (1 - 0.4) 0.03)$

Bu = 1.62

Per acquisition

Equity = 265M * 30 = 7.950 million

D/E = 0.03 $\rightarrow$ D/7.950 = 0.03

Debt = 238.5 million

نضرب ضرب تبادلي.

Combined firm

D = 238.5 m + 2000 m = 2.238m

E = 265M * 30 = 7.950M

$BL = Bu (1 + (1 - t) D/E)$

$BL = 1.62 (1 + (1 - 0.4) * 2.238 / 7.950) = 1.89 \rightarrow BL = 1.89$

Question 3 :

You have run a regression of Google returns against returns on the S&P500 and the equation was as follows:

$$\text{Returns}_{\text{Google}} = 0.0001 + 0.75 (\text{Returns}_{\text{S\&P500}}) \quad R^2 = 0.55, \text{ the standard error for the beta estimate is } 0.6$$

You also note that the average **unlevered beta** for comparable firms is **1.4**, Google's **debt-to-equity ratio** **30%**, **T-bond rate** is **0.075** and the **equity risk premium** is **0.085** and Google AA rate bond **default spread** is **0.015**. (**Tax rate = 40%**)

Please write your answers in decimals.

1. What is the levered beta for Google?

$$\begin{aligned} BL &= BU * (1 + (1 - \text{tax}\%) * D/E) \\ &= 1.4 (1 + (1 - 0.4) 0.3) = 1.652 \end{aligned}$$

2. What is Google's after tax cost of debt?

$$\begin{aligned} \text{After tax cost} &= (\text{T-bills rate} + \text{Spread}) (1 - \text{tax rate}) \\ &= (0.075 + 0.015) (1 - 0.40) = 5.4\% \end{aligned}$$

3. What is Google's cost of equity?

$$\begin{aligned} \text{Cost of equity} &= R_f + \text{Beta} * \text{ERP} \\ R_f &= .075, \text{ Beta} = 1.652, * \text{ERP} = .085 \\ &= .075 + 1.652 * 0.085 = 21.542\% \end{aligned}$$

4. What is the WACC?

$$\begin{aligned} \text{WACC} &= K_D * W_D + K_E * W_E \\ K_D &= .054 \quad K_E = .2154 \quad W_D = \text{Debt/Equity ratio} = 30\% \\ W_D &= \text{Debt} / (\text{d/e ratio} + 1) = 0.30 / (1 + 0.30) = .2308 \\ W_E &= 1 - W_D = (1 - .2308) = .7692 \\ \text{Wacc} &= (0.054 * 0.2308) + (0.2154 * 0.7692) \\ &= .1781 \text{ or } 17.81\% \end{aligned}$$

5. What is the firm specific risk?

$$\begin{aligned} R &= 1 - R^2 \\ &= 1 - 0,55 = 0,45 \end{aligned}$$

6. What is the market risk?

$$R = 0,55$$

7. What is the lower bound in a 95 confidence interval for beta estimate?

$$\begin{aligned} & (B - 2 * SE) \\ &= 0.75 - 2 * 0.6 = - 0.45 \end{aligned}$$

8. What is the upper bound in a 95 confidence interval for beta estimate?

$$\begin{aligned} & (B + 2 * SE) \\ &= 0.75 + 2 * 0.6 = 1.95 \end{aligned}$$

good attempt ❤️

Solutions problems and questions chapter 4

Problem 1 :

In December 1995, Boise Cascade's stock had a beta of 0.95. The Treasury bill rate at the time was 5.8%, and the Treasury bond rate was 6.4%. The firm had debt out-standing of \$1.7 billion and a market value of equity of \$1.5 billion; the corporate marginal tax rate was 36%.

- Estimate the expected return on the stock for a short-term investor in the company. (The arithmetic average risk premium for stocks over T.Bills was 8.76% at the time of this assessment)
- Estimate the expected return on the stock for a long-term investor in the company.
- Estimate the cost of equity for the company.

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Beta = 0,95

Treasury bill rate = 5.8%

Treasury bond rate = 6.4%

Debt = \$1,7

Equity= \$1.5

Tax rate = 36%

A) ERP = 8,76

$$\begin{aligned} E(r) &= R_f + B * ERP \\ &= 5,8 + 0,95 * 8,76 = 14,12\% \end{aligned}$$

B) $E(r) = R_f + B * ERP$

$$= 6,4 + 0,95 * 5,5 = 11,62\%$$

C) Cost of equity = 11,62%

Problem 2 :

Boise Cascade also had debt outstanding of \$1.7 billion and a market value of equity of \$1.5 billion; the corporate marginal tax rate was 36%.

- Assuming that the current beta of 0.95 for the stock is a reasonable one, estimate the unlevered beta for the company.
- How much of the risk in the company can be attributed to business risk and how much to financial leverage risk?

$$D = \$1,7B$$

$$E = \$1,5B$$

$$T = 36\%$$

$$A) 0,95$$

$$BL = Bu (1 + \{1-t\} D/E)$$

$$0,95 = Bu (1 + \{1-0,36\} 1,7/1,5)$$

$$0,95 = Bu (1 + 0,64*1,13)$$

$$0,95 = 1,72Bu \rightarrow Bu = 0,55$$

$$B) \text{ Total risk} = \text{business risk} + \text{financial risk}$$

$$\text{business risk} = 0,55 / 0,95 = 0,5$$

$$\text{financial risk} = 1 - 0,57 = 0,43$$

Problem 3 :

Biogen, a biotechnology firm, had a beta of 1.70 in 1995. It had no debt outstanding at the end of that year.

- Estimate the cost of equity for Biogen, if the Treasury bond rate is 6.4%.
- What effect will an increase in long-term bond rate to 7.5% have on Biogen's cost of equity?
- How much of Biogen's risk can be attributed to business risk?

$$\text{ERP} = 5.5\%$$

$$\text{Tax} = 40\%$$

$$B = 1.70$$

$$\text{Debt} = 0$$

A) $K_e = ??$

$$\text{Treasury bond rate} = 6.4\%$$

$$R_f + B * \text{ERP}$$

$$6.4 + 1.70 * 5.5 = 15.75\%$$

B) Treasury bond rate (long term bond rate) = 7.5%

Cost of equity (K_e) = ??

$$K_e = R_f + B * \text{ERP}$$

$$7.5\% = 1.70 * 5.5\% = 16.85\% \rightarrow K_e = 16.85\%$$

C) Since the firm had no debt, (all is attributed to business risk).

Problem 4 :

- Expected Return = $11.5\% + 1.15 (7.50\%) = 20.13\%$
 $\Rightarrow$ {I am using a premium of 7.50% for Malaysian stocks to reflect its higher risk.}
- This beta measures risk relative to a Malaysian index. For an international investor an more appropriate beta may be the one estimated relative to a global index.

Problem 5 :

- a. A.Expected Return = $3\% + 1.2 (8.5\%) = 13.20\%$
- b. Expected Price Appreciation = $13.20\% - (\$ 2.50 / \$ 50) = 8.20\%$
Expected Price one year from today = $\$ 50 (1.082) = 54.10 \$$
- c. Expected Returns over last year = $5\% + 1.20 (-5\% - 5\%) = -7.00\%$
Returns on Market = $-8\% + 3\% = -5\%$
- d. Actual Returns over last year = $(50-54+2)/54 = -3.70\%$
- e. Unlevered Beta = $1.20 / (1+ (1-.4) (50/100)) = 0.923$
If the firm issues \$ 50 million in equity and retires debt, its beta will drop to 0.923

Problem 6 :

Safecorp, which owns and operates grocery stores across the United States, currently has \$50 million in debt and \$100 million in equity outstanding. Its stock has a beta of 1.2. It is planning a leveraged buyout, where it will increase its debt-to-equity ratio of 8. If the tax rate is 40%, what will the beta of the equity in the firm be after the leveraged buyout?

Safe corp

Debt = 50M

Equity = 100M

Beta = 1,2

Debt to equity ratio = 8

Tax = 40%

$$\mathbf{BL = Bu (1 + (1 - t) D/E)}$$

$$1,2 = Bu (1 + (1 - 0,4) 50/100)$$

$$1,2 = Bu (1+0,6* 0,5) = 0,92 \rightarrow \mathbf{Bu = 0,92}$$

$$\mathbf{BL = Bu (1 + (1 - t) D/E)}$$

$$BL = 0,92 (1 + (1 - 0,4) 8) = 5,33 \rightarrow \mathbf{BL = 5,33}$$

Problem 7 :

Novell, which had a market value of equity of \$2 billion and a beta of 1.50, announced that it was acquiring Word- Perfect, which had a market value of equity of \$1 billion and a beta of 1.30. Neither firm had any debt in its financial structure at the time of the acquisition, and the corporate tax rate was 40%.

- Estimate the beta for Novell after the acquisition, assuming that the entire acquisition was financed with equity.
- Assume that Novell had to borrow the \$1 billion to acquire WordPerfect. Estimate the beta after the acquisition.

Novell :

$$E = 2.$$

$$D = 0.$$

$$B = 1,5.$$

the corporate tax rate was 40%.

Word- Perfect:

$$E = 1$$

$$D = 0$$

$$B = 1,3$$

A) Step 1 unlevered beta first :

$$BL = Bu (1 + (1 - t) D/E)$$

$$1,5 = Bu (1 + (1 - 0,4) 0) \mid Bu = 1,5$$

$$BL = Bu \text{ if } D/E = 0$$

$$\text{Word- Perfect} \rightarrow Bu = Bu = 1,3 \rightarrow D/E = 0$$

Step 2 calculate beta unlevered for the combined firm:

$$Bu = 1,5*(2B/3B) + 1,3*(1B/3B) = 1,43$$

$$\text{Total value of the combined firm} = \$2 \text{ billion} + \$1 \text{ billion} = \$3 \text{ billion}$$

B) Novell acquire WordPerfect.

$$Bu = 1,43$$

$$Bl = ??$$

$$BL = Bu (1 + (1 - t) D/E)$$

$$BL = 1,43 (1 + (1 - 0,4) 1/2) = 1,86 \rightarrow Bl = 1,43$$

Problem 9 :

The following table summarizes the percentage changes in operating income, percentage changes in revenue, and betas for four pharmaceutical firms.

Firm	% Change in Revenue	% Change in Operating Income	Beta
PharmaCorp	27	25	1.00
SynerCorp	25	32	1.15
BioMed	23	36	1.30
Safemed	21	40	1.40

- Calculate the degree of operating leverage for each of these firms.
- Use the operating leverage to explain why these firms have different betas.

A. $DOL = \% \Delta \text{ in operating income} / \% \Delta \text{Revenues}$.

$$DOL_1 = 25\% / 27 = 0.93$$

$$DOL_2 = 32\% / 25 = 1.28$$

$$DOL_3 = 36\% / 23 = 1.57$$

$$DOL_4 = 40\% / 21 = 1.9$$

**B. The higher the degree of operating leverage, the higher the risk
→ the higher the beta.**

Problem 15 :

You have run a regression of monthly returns on Am- gen, a large biotechnology firm, against monthly returns on the S&P 500 Index, and come up with the following output:

$$R_{\text{stock}} = 3.28\% + 1.65 R_{\text{Market}} \quad R^2 = 0.20$$

The current one-year Treasury bill rate is 4.8% and the current thirty-year bond rate is 6.4%. The firm has 265 million shares outstanding, selling for \$30 per share.

- A. What is the expected return on this stock over the next year?
- B. Would your expected return estimate change if the purpose was to get a discount rate to analyze a thirty-year capital budgeting project?
- C. An analyst has estimated correctly that the stock did **51.10% better than expected annually during the period of the regression**. Can you **estimate the annualized risk-free rate** that she used for her estimate?
- D. The firm has a **debt-to-equity ratio of 3%** and faces a tax rate of 40%. It is planning to issue **\$2 billion** in new debt and **acquire a new business** for that amount, with the same risk level as the firm's existing business. What will the beta be after the acquisition?

A) $E(r) = ??$

$$E(r) = RF + B * ERP$$

$$E(r) = 4.8 + 1.65 * 8.76 = 19.25\%$$

B) $E(r) = RF + B * ERP \rightarrow \text{long term}$

$$E(r) = 6.4 + 1.65 * 5.5 = 15.47\%$$

51.10% better than expected **annually**

$$\text{Monthly Jensen's} = (1 + 51.1)^{1/12} - 1 = 3.5\%$$

$$\text{Monthly Jensen's alpha} = 3.5\%$$

C) $\text{Jensen alpha} = a - (1 - B) * R_f$

$$3.5\% = 3.28\% - (1 - 1.65) * R_f$$

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

$$0.035 - 0.0328 = 0.65R_f$$

$$0.022 = 0.65R_f$$

$$\text{Monthly } R_f = 0.0338\%$$

$$\text{Annualized } R_f = (1 + 0.0338)^{12} - 1 = 0.49\%$$

D) $D / E = 0.03$
Tax rate = 40%

$$\mathbf{BL = Bu (1 + (1 - t) D/E)}$$

$$1.65 = Bu (1 + (1 - 0.4) 0.03)$$

$$\mathbf{Bu = 1.62}$$

Per acquisition

$$\text{Equity} = 265\text{M} * 30 = 7.950 \text{ million}$$

$$D/E = 0.03 \rightarrow D/7.950 = 0.03$$

$$\text{Debt} = 238.5 \text{ million}$$

Combined firm

$$D = 238.5 \text{ m} + 2000 \text{ m} = 2.238\text{m}$$

$$E = 265\text{M} * 30 = 7.950\text{M}$$

$$BL = 1.62 (1 + (1 - 0.4) * 2.238 / 7.950) = 1.89 \rightarrow BL = 1.89$$

Problem 17 :

Time Warner, the entertainment conglomerate, has a beta of 1.61. Part of the reason for the high beta is the debt left over from the leveraged buyout of Time by Warner in 1989, which amounted to \$10 billion in 1995. The market value of equity at Time Warner in 1995 was also \$10 billion. The marginal tax rate was 40%.

- Estimate the unlevered beta for Time Warner.
- Estimate the effect of reducing the debt ratio by 10% each year for the next two years on the beta of the stock.

$$\mathbf{B = 1.61}$$

$$\mathbf{\text{Debt} = \$10 \text{ billion}}$$

$$\mathbf{\text{Equity} = \$10 \text{ billion}}$$

$$\mathbf{\text{Tax rate} = 40\%}$$

$$\mathbf{A. Bu = ??}$$

$$\mathbf{BL = Bu (1 + (1 - t) D/E)}$$

$$1.61 = Bu (1 + (1 - 0.4) 10/10) = 1.01 \mid Bu = 1.01$$

B. Debt ratio = 10%

$$\text{Debt ratio} = D / D+E$$

$$\text{Current debt ratio} = 10B / 10B + 10B = 10B / 20B = 1/2$$

After 1 year

$$\text{Debt ratio} = 50\% / 10\% = 0.4$$

$$\text{Debt ratio} = D / D+E \rightarrow 40/100 = 40 \mid D = 40$$

$$\text{Equity} = 100 - 40 = 60$$

$$D/E = 40/60$$

$$BL = Bu (1 + (1 - t) D/E)$$

$$BL = 1.01 (1 + (1 - 0.4) 40/60)$$

$$BL = 1.41$$

After 2 year

بعد سنتين قلت أخرى ١٠٪.

$$\text{New debt ratio} = 40\% - 10\% = 30\%$$

$$\text{Debt ratio} = D / D+E \rightarrow 30/100 = 30 \mid D = 30$$

$$\text{Equity} = 100 - 30 = 70$$

$$BL = Bu (1 + (1 - t) D/E)$$

$$BL = 1.01 (1 + (1 - 0.4) 30/70)$$

$$BL = 1.27$$

Problem 20 :

As the result of stockholder pressure, RJR Nabisco is considering spinning off its food division. You have been asked to estimate the beta for the division and decide to do so by obtaining the beta of comparable publicly traded firms. The average beta of comparable publicly traded firms is 0.95, and the average debt-to-equity ratio of these firms is 35%. The division is expected to have a debt ratio of 25%. The marginal corporate tax rate is 36%.

- What is the beta for the division?
- Would it make any difference if you knew that RJR Nabisco had a much higher fixed cost structure than the comparable firms used here?

$$a. 0.95 = Bu (1 + (1 - 0.36) 0.35) = 0.77$$

$$BL \text{ division} = 0.77 (1 + (1 - 0.36) 0.25) = 0.89$$

- Yes. The higher fixed cost structure would lead me to use a higher unlevered beta for Nabisco .

Problem 23 :

You are analyzing Tiffany's, an upscale retailer, and find that the regression estimate of the firm's beta is 0.75; the standard error for the beta estimate is 0.50. You also note that the average unlevered beta of comparable specialty retailing firms is 1.15.

- A. If Tiffany's has a debt-to-equity ratio of 20%, estimate the beta for the company based on comparable firms. (The tax rate is 40%)
- B. Estimate a range for the beta from the regression.
- C. How would you reconcile the two estimates? Which one would you use in your analysis?

A. **$BL = Bu (1 + (1 - t) D/E)$**
 $BL = 1.5 (1 + (1 - 0.4) 0.2) = 1.33$

B. Range for beta from regression → 95% confidence interval
 $[Beta - 2*SD(B) , Beta + 2*SD(B)]$
 $[0.75 - 2*0.50 , 0.75 + 2*0.50]$
 $= [- 0.25 , 1.76]$

- C. Bottom up beta is more precise estimate than regression bets.

The end❤️

Format

1) The correct risk free rate to use in computing the hurdle rate for a company is

- a. The government bond rate in the country in which the company is incorporated.
- b. The risk free rate in the currency in which the company reports its financial statements.
- c. The government bond rate in the currency in which you choose to estimate cash flows and returns.
- d. The risk free rate in the currency in which you choose to estimate cash flows and returns.**
- e. None of the above.

2) Multinationals operate in many countries and often generate cash flows in multiple currencies. In computing the risk free rate to use in coming up with the hurdle rate for a multinational, which of the following would you use:

- a. A weighted average of the risk free rates in all of the currencies in which the company generates cash flows.
- b. A simple average of the risk free rates in all of the currencies in which the company generates cash flows.
- c. The lowest of the risk free rates in all of the currencies in which the company generates cash flows.
- d. The highest of the risk free rates in all of the currencies in which the company generates cash flows.
- e. None of the above.**

3) If investors are rational, the expected equity risk premium for a market should never be less than zero.

- a. True**
- b. False

4) Assume that you are estimating a US dollar hurdle rate for a Mexican company with US operations. Which of the following would you use as your risk free rate? (You can assume that Mexico's sovereign rating is Baa1 for both its local currency and foreign currency bonds)

a. The rate on a ten-year US treasury bond (2%).

b. The rate on a 3-month US treasury bill (0.25%).

c. The rate on a dollar denominated Mexican Government bond (3.5%).

d. The rate on a peso denominated Mexican Government bond (6%).

e. The rate on a US dollar denominated bond issued by the Mexican company (4.5%).

f. None of the above.

5) Assume that you are now estimating a peso hurdle rate for a Mexican company with US operations. Which of the following would you use as your risk free rate? (You can assume that Mexico's sovereign rating is Baa1 for both its local currency and foreign currency bonds)

a. The rate on a ten-year US treasury bond (2%).

b. The rate on a 3-month US treasury bill (0.25%).

c. The rate on a dollar denominated Mexican Government bond (3.5%).

d. The rate on a peso denominated Mexican Government bond (6%).

e. The rate on a US dollar denominated bond issued by the Mexican company (5%).

f. None of the above.

6) Assume that you have computed risk free rates in a dozen major currencies and are coming up with different numbers. Which of the following will best explain why risk free rates will vary across currencies?

a. Rates will be higher in emerging markets than in developed markets.

b. Rates will be higher in high growth markets than low growth markets.

c. Rates will be higher in high-inflation currencies than in low-inflation Currencies.

d. Rates will be higher in riskier markets than in safe ones.

e. Estimation error.

- 7) The equity risk premium is the premium that investors charge over and above the risk free rate to invest in equities. A key source of information about equities is earnings reports from companies. In the last two decades, companies have used both accounting discretion and operating choices to “manage” their earnings, making them smoother (less variability over time). What consequence would you expect for equity risk premiums from managed earnings?
- a. Equity risk premiums should go down. (Earnings are smoother).
 - b. Equity risk premiums should go up. (Earnings are less informative).**
 - c. Equity risk premiums should not change.
- 8) Many analysts use past data on stock and government security returns to estimate a historical risk premium. Assume that the arithmetic (geometric) average of annual stock returns is 10% (9%) and that the arithmetic (geometric) average of annual treasury bond returns is 5% (4.5%) over a hundred year period. If the annualized standard deviation in stock returns over this period was 20%, which of the following is your fairest characterization of the historical risk premium (which you plan to use in your long term hurdle rate)?
- a. Historical risk premium is 5%, standard error is 20%.
 - b. Historical risk premium is 4.5%, standard error is 2%.**
 - c. Historical risk premium is 5.5%, standard error is 2%.
 - d. Historical risk premium is 4%, standard error is 2%.
 - e. None of the above.
- 9) To compute the implied ERP, one input that you need is the expected growth rate in earnings/cash flows in future years. That input can be estimated by looking at analyst estimates of growth in earnings for individual companies, but there are studies that indicate that these estimates are biased upwards. Assuming that these growth rates are biased upwards, what effect will it have on your computed ERP?
- a. You will over estimate the implied ERP**
 - b. You will under estimate the implied ERP
 - c. You could under or over estimate the implied ERP

10) There are some analysts who use historical risk premiums with emerging markets, using average premiums over ten to fifteen years, in their estimates. Which of the following would you be most concerned about, with this approach?

- a. Equity risk premiums will be too high, since emerging markets do better than developed markets.
- b. Equity risk premiums will be too low, if there is a bear market during the estimation period.
- c. A historical risk premium with only ten to fifteen years of data will have a very high standard error.**
- d. Emerging markets are too volatile.
- e. Emerging markets are dynamic and changing over time.

11) The sovereign rating for Vietnam is B2 (with a default spread of 5%), the standard deviation in the Vietnamese equity index is 30% and the standard deviation in the Vietnamese government bond is 24%. If the premium for a mature market (say, the US) is 5.5%, estimate the total equity risk premium for Vietnam.

- a. 11.75%**
- b. 6.25%
- c. 5%
- d. 10.5%**
- e. None of the above

12) When a company is geographically diversified, it should be able to diversify away country risk. There is therefore no need to adjust equity risk premiums for country risk.

- a. True
- b. False**

13) The implied equity risk premium is a forward-looking premium, estimated from the level of stock prices (the index) today and expected earnings/cash flows in the future. Assume that you compute the implied ERP at the start of a year and the market goes up 20% during the course of the year and that you compute the implied ERP again at the end of the year. Assuming that the risk free rate and growth rate do not change over the course of the year, which of the following would you expect to happen to the implied ERP?

- a. The ERP will go down.
- b. The ERP will go down, if the earnings/ cash flows went up by less than 20% during the year.**
- c. The ERP will go down, if the earnings/ cash flows went up by more than 20% during the year.
- d. The ERP will not change.
- e. The ERP will go up.

14) You are trying to estimate the equity risk premium to use for Vortex, a US company that derives 80% of its revenues in Brazil and 20% in the United States. You have estimated an implied equity risk premium of 5% for the United States but don't have the inputs to estimate the implied equity risk premium for Brazil. The sovereign CDS spread for Brazil is 2% and you estimate that equities in Brazil are 1.25 times more volatile than the Brazilian government bond. What is the equity risk premium that you will use for Vortex,

- a. 5%
- b. 5.5%
- c. 6.25%
- d. 7.0%**
- e. 7.5%

15) Patiala Cement is an Indian cement company that derives 80% of its revenues in India and 20% in Nigeria; the ERP for India is 8% and the ERP for Nigeria is 10%. Over the next decade, the company expects its revenues in India to increase by 50% and revenues in Nigeria to quadruple. Estimate the equity risk premium for Patiala Cements at the end of the decade.

- a. 8.00%
- b. 8.4%
- c. 8.8%**
- d. 9.00%
- e. 10.00%

16) You are trying to estimate a beta for Sosa Inc., a Brazilian retail firm. The stock is widely traded and 20% of the shares are held by global investors, who account for 60% of the trading on the stock. It has also depository receipts listed in the US, which are dollar denominated and liquid. Which of the following regressions would you use to estimate the beta?

- a. The local listing against the Bovespa, the Brazilian equity index
- b. The ADR, against the S&P 500
- c. The ADR, against the MSCI, a global equity index**
- d. The local listing against an index of Brazilian retailers
- e. None of the above

17) You have run a regression of monthly returns for Cyprus Industries, a publicly traded chemical company, against the S&P 500 and obtained the following:

- **Returns_{Cyprus} = -0.15% + 1.80 Returns_{S&P 500} R² = 35%**
- **The average annual risk free rate during the period 3.60%.**

On a market-adjusted, risk-adjusted basis, how well did Cyprus do during this time period?

- a. About 1.08% better than expected**
- b. About -1.80% worse than expected
- c. About 1.08% worse than expected
- d. About 1.80% better than expected
- e. None of the above

18) In the Cyprus Industries regression above, the R-squared was 35%. Now assume that Cyprus decides to acquire a technology company of roughly equal size, with an R-squared of 15%. Assuming that you run a regression of Cyprus in a couple of years, which of the following would you expect to see happen to the R-squared of the combined company?

- a. It will be lower than 15%
- b. It will be approximately 25% (halfway between 15% and 35%)
- c. If will be between 15% and 25%**
- d. It will be higher than 25%

19) Staying with the Cyprus Industries analysis, assume that the standard error on your regression beta is 0.30. Which of the following estimates would provide a range for the “true” beta with 95% confidence?

- a. 1.20-2.40**
- b. 1.50-2.10
- c. 1.65- 1.95
- d. 0.90-2.70
- e. None of the above

20) You are trying to gauge whether there is a relationship between the management of a firm and the Jensen’s alpha that you compute for the firm. Which of the following is the best indicator that management has done a good job?

- a. Firm has positive Jensen’s alpha
- b. Firm has negative Jensen’s alpha
- c. Firm has positive Jensen’s alpha; Average Jensen’s alpha for the sector is negative**
- d. Firm has positive Jensen’s alpha; Average Jensen’s alpha for the sector is positive
- e. None of the above

21) The beta for a firm should reflect the “discretionary” nature of its products and/or services; the more discretionary a product or service is, the higher you would expect the beta to be. Given this principle, rank the following categories of retail firms from lowest to highest beta:

- a. Discount retailer (Walmart)
- b. High End Department store (Bergdorf Goodman)
- c. Department store (Macy's)
- d. Grocery store (Safeway)
- e. Luxury retailer (Tiffany's)

22) A company is considering outsourcing its personnel services. By doing so, it will replace the fixed cost of having a human resources department with an hourly fee that it will be paying a vendor who will provide the services. Holding all else constant, what effect would this action have on the beta for the company?

- a. It will increase the beta
- b. It will decrease the beta**
- c. It will not change the beta

23) Arnold Entertainment owns movie complexes and has 10 million shares trading at \$10/share and \$40 million in debt. Its current equity beta (levered) is 0.93 and it plans to raise fresh equity and retire all of its debt. If it does so and the marginal tax rate is 40%, what will its beta be after the transaction?

- a. 0.80
- b. 0.79
- c. 0.75**
- d. 1.15
- e. None of the above

24) Gepla Software is a steel company with 100 million shares trading at \$25/share and \$500 million in debt. You have run a regression of the firm's stock returns against a market index using the last 5 years of data and have estimated a beta of 1.06. If the regression beta is right, the average debt to equity ratio for the company over the last 5 years was 10% and the marginal tax rate is 40%, estimate the beta for the equity, given its current financial leverage.

a. 1.12

b. 1.06

c. 1.19

d. 1.10

e. 1.00

25) Reefer System has a market capitalization of \$ 1 billion and it will be buying Lyman Technology for \$ 500 million, with a combination of \$250 million in debt and \$250 million in stock. You can assume that neither company had debt or cash prior to the transaction, and that the marginal tax rate for all companies is 40%. If Reefer's beta prior to the transaction was 1.20 and Lyman's beta was 0.90, estimate the beta in Reefer's equity after the transaction.

a. 1.10

b. 1.23

c. 1.19

d. 1.14

e. None of the above

good attempt❤️

Midterm 1

Question one:

Genuine Care is a company that offers health care services. The company has \$150 million in interest-bearing debt (in book value and market value terms). The firm has 26 million shares trading at \$ 10 a share, and the unlevered beta of comparable firms in the health care business is 0.9. The firm has a current rating of B, with a default spread of 0.05 over the risk-free rate. The risk-free rate is 0.035, the equity risk premium is 0.07 and the corporate tax rate is 40%.

- a. What is the levered beta for firm?
- b. Estimate the cost of equity for the firm.
- c. Estimate the before-tax cost of debt for the firm.
- d. Estimate the after-tax cost of debt for the Firm.

- e. What is the market value weight of debt?
- f. What is the market value weight of equity?
- g. Estimate the cost of capital for the firm.

Question tow:

consider the following regression equation for Golden Books---

$\text{Returns}_{\text{Golden Books}} = -1.31\% + 0.85 (\text{Returns}_{\text{S\&P 500}})$.

Assume that the firm had an average debt to equity ratio of 50% during the three years of the regression, and that it was in only one business which is publishing.

The firm wants to add a new business to its operation with a new debt to equity ratio of 150%, and the firm expects that half its future revenues and earnings will come from children videos (the new business). The average beta of firms specializing in children's videos is 1.10, and these firms have an average debt to equity ratio of 25%; they face an average tax rate of 40%.

Estimate the beta for Golden Books, looking forward. (You can assume that Golden Books will also face a tax rate of 40%).

Question three :

You have run a regression of returns of Devonex, a machine tool manufacturer, against the S&P 500 Index using monthly returns over the last 5 years and arrived at the following regression:

$$\text{Return}_{\text{Devonex}} = -0.20\% + 1.50 \text{ Return}_{\text{S\&P 500}}$$

If the stock had a Jensen's alpha of +0.10% (on a monthly basis) over this period, estimate the monthly riskfree rate during the last 5 years

Question four:

Samsung, which had a market value of equity \$ 30000 million and \$4500 million outstanding debt and a beta of 1.8, announced that it was acquiring Nokia, which had a market value of equity \$ 16000 million and \$600 million outstanding debt and a beta of \$ 1.4 and the corporate tax rate was 40%.

- 1) Estimate beta unlevered for Samsung.
- 2) Estimate beta unlevered for Nokia.
- 3) Estimate beta unlevered for the combined firm.

- 4) Estimate beta levered for the combined firm assuming the entire acquisition was financed with equity.
- 5) Estimate beta levered for the combined firm assuming the entire acquisition was financed with debt.
- 6) Estimate beta levered for the combined firm assuming that Samsung borrowed \$10,000 million debt to buy Nokia and funded the rest with new equity.

Good luck ❤️

Midterm 2

Part one: Multiple Choice: (15 marks)

- 1) Which one of the following events would most likely create a conflict between shareholders and bondholders with the bondholders losing value?
 - a. **An increase in the risk of a firm's investments.**
 - b. An increase in the firm's net worth.
 - c. A decrease in the amount of debt outstanding .
 - d. A decrease in the amount of dividends paid out.
- 2) The importance of being able to measure systematic or market risk is that:
 - a. it is necessary in order to measure the total risk of an asset .
 - b. The risk premium depends only on the company specific risk of an investment.
 - c. **This is the only type of risk that is rewarded.**
 - d. The risk premium depends on both systematic and unsystematic risk.
- 3) Pop United Merchants has a beta of 1.0 and very high firm-specific risk. If the expected return on the market is 20 percent, the expected return on United will be
 - a. 10 percent if the risk free rate is 10 percent.
 - b. **20 percent.**
 - c. More than 20 percent because of the high firm-specific or unique risk.
 - d. Indeterminate unless you also know the risk free rate.
- 4) The beta for a firm should reflect the "discretionary nature of its products and/or serve wow discretionary a product or service is, the higher you would expect the beta t principle, which of the following has the highest beta?
 - a. Discount retailer (Walmart)
 - b. Department store (Macy's)
 - c. Grocery store (Safeway)
 - d. **Luxury retailer (Tiffany's)**

5) The correct risk free rate to use in computing the hurdle rate for a company is

- a. The government bond rate in the country in which the company is incorporated
- b. The risk free rate in the currency in which the company reports its financial statements .
- c. The government bond rate in the currency in which you choose to estimate cash flows and returns.
- d. The risk free rate in the currency in which you choose to estimate cash flows and returns .**
- e. None of the above.

6) To compute the implied ERP, one input that you need is the expected growth rate in earnings/cash flows in future years. That input can be estimated by looking at analyst estimates of growth in earnings for individual companies, but there are studies that indicate that these estimates are biased upwards. Assuming that these growth rates are biased upwards, what effect will it have on your computed ERP?

- a. You will overestimate the implied ERP.**
- b. You will under estimate the implied ERP .
- c. You could under or overestimate the implied ERP.

7) A company is considering outsourcing its personnel services. By doing so, it will replace the fixed cost of having a human resources department with an hourly fee that it will be paying vendor who will provide the services. Holding all else constant, what effect would this action have on the beta for the company?

- a. It will increase the beta.
- b. It will decrease the beta.
- c. It will not change the beta.

8) The objective in corporate finance is to maximize firm value. In practice, this is often narrowed down to maximizing the stock prices, for publicly traded firms. For the two objectives to be equivalent, which of the following assumptions do you need to make?

- a. Bondholders/ Lenders interests are fully protected
- b. Financial markets are efficient and rational
- c. Information about the firm is provided both timely and unbiased.
- d. All of the above**
- e. None of the above

9) Which of the following is the primary mission of a board of directors in a publicly traded firm?

- a. To provide advice and counsel to the top managers of the firm
- b. To protect incumbent managers from stockholder pressures and defend them against criticism.
- c. To ensure that top managers are acting in the best interests of the stockholders .**
- d. To protect society's best interests None of the above

10) The power that stockholders have to hold managers accountable can be affected by the ownership structure in the firm. In which one of the following ownership structures will stockholders be able to influence management decisions the most?

- a. There are a large number of small stockholders (individuals) in the firm.
- b. The government is the largest stockholder in the firm.
- c. The employee pension fund is the largest stockholder in the company.
- d. Mutual funds and pension funds hold a large proportion of the firm's shares.
- e. Activist investors (Hedge funds, private equity investors) hold a large proportion of the shares in the firm

Part two: Problem-solving (15 marks)**Question one: (6 marks)**

Mada, a computer manufacturer, announces that it will be acquiring Call U Software. Mada had a beta of 1.8 prior to merger. Mada has a market value of equity of \$12 billion and \$10 billion debt outstanding. Call U Software had a beta of 1.2 prior to merger. The firm has a market value of equity of \$10 billion and \$2 billion in debt outstanding.

Note: Mada had bought Call U with all equity; both firms have a 40% tax rate.

- A. Estimate the unlevered beta for Mada. (1 mark)
- B. Estimate the unlevered beta for Call U. (1 mark)
- C. Estimate the unlevered beta for the combined firm. (2 marks)
- D. Estimate the levered beta for the combined firm. (2 marks)

Question two: (4 marks)

You have run a regression of returns of Devonex , a machine tool manufacturer, against the S&P500 Index using monthly returns over the last 5 years and arrived at the following regression:

$$\text{Returner} = -0.20\% + 1.50 \text{ ReturnS\&P500}$$

- A. The stock had a Jensen's alpha of +0.10% (on a monthly basis) over this period
- Has the stock beaten the market? Explain (1 mark)
 - Estimate the monthly risk-free rate during the last 5 years. (1 mark)
- B. If the standard error of the regression beta is 0.4. Estimate the range for the regression beta at a 95% confidence interval? (1 mark)
- C. If the market risk premium is 6.5%, the tax rate is 40% .Estimate the cost of equity for Devonex (1 mark)

Question three :(four marks)

The following table summarizes the percentage changes in operating income, percentage changes in revenue and beta for three firms:

Firm	%change in revenues	% change in operating income	Beta
ABC	23	27	1.2
XYZ	27	34	1.35
TSL	25	38	1.5

A. Calculate the degree of operating leverage for each of the business firms. (3 marks)

B. Use the operating leverage to explain why these firms have different betas. (1 mark)

Question four:(2 marks)

You are trying to estimate the beta for Daimler AG, a German auto company. You run two regressions, one against the DAX (the German equity index) and one against the Morgan Stanley Capital Index (a global equity index). The results of both are provided below:

$$\text{Return}_{\text{Daimler}} = 0.33\% + 1.04 \text{ Returns}_{\text{Dax}} \quad R^2 = 61\%$$

$$\text{Return}_{\text{Daimler}} = 0.16\% + 0.81 \text{ Returns}_{\text{MSCI}} \quad R^2 = 24\%$$

The risk-free rate in Euros is 4.5%, while the U.S. Treasury bond rate is 6%. The equity risk premium for a mature market is estimated to be 5.5%. Assuming that the marginal investor in Daimler is globally diversified, estimate the cost of equity for the firm in Euros.

Question five :(4 marks)

Meta Company has a beta of 1.7. Part of the reason for the high beta is the debt left from the leveraged buyout which amounted \$8 billion and the market value of equity at Meta was \$ 10 billion. The marginal tax rate 40%.

- a) Estimate the unlevered beta for Meta Company. (1 mark)
- b) Estimate the effect of reducing the debt ratio by 5% next year on the beta of the stock (3 marks)

Good luck ❤️

Questions from the final exam

Question one: (10 marks)

You are trying to estimate the cost of capital for Trans Victoria Steel, Limited. The firm has provided you with the following information:

- There are 100 million shares outstanding, trading at \$ 10 a share.
- The firm has debt outstanding of \$ 500 million, in market value terms.
- The levered beta for the firm currently is 1.3, the risk-free rate is 5% and the equity risk premium is 5.5%.
- The firm's current bond rating is A; the default spread for an A-rated bond is 1.5%.
- The marginal tax rate is 40%.

a. Estimate the cost of equity for the firm (2 marks)

b. Estimate the before-tax cost of debt for the firm. (2 marks)

c. Estimate the after-tax cost of debt for the firm. (2marks)

d. Estimate the cost of capital (or WACC) for the firm. (2 marks)

e. Why does the firm need an estimate of its WACC? (2 marks)

Question two:(10 marks)

You are trying to estimate the beta for a private firm that manufactures home appliances. You have managed to obtain betas for publicly traded firms that also manufacture home appliances.

Firm	Levered beta	Debt (in million)	Market value of equity (in million)
Samsung	1.4	\$2,400	\$3,200
Magic	1.5	\$2,800	\$4,200
Smart	1.2	\$520	\$2,000
LG	1.1	\$6	\$300
Fakir	0.7	\$9	\$500

The private firm has a debt-to-equity ratio of 20% and faces a tax rate of 40%. The publicly held firms all have marginal tax rates of 40% as well.

- Calculate the average levered beta for comparable firms. (1 mark)
- Calculate the debt to equity ratio for each firm. (3 marks)
- Calculate the average debt to equity ratio. (1 mark)
- Estimate the average unlevered beta of comparable firms. (1 mark)

Good luck ❤️

Quiz

Question 1 : following table lists the stock prices for Microsoft from 1990-1995. The company did not pay any dividends during the period.

Year	Price	Return
1990	1.20	
1991	2.09	
1992	4.64	
1993	5.34	
1994	5.05	
1995	7.64	

A) Estimate both the arithmetic and geometric mean for Microsoft .

B) Estimate the semi-variance.

Question 2 : Every business faces risk. As a business owner, which of the following is the best approach to dealing with risk:

- a. Avoid all risk at any cost
- b. Take every risk that you can. You are in business to take risks.
- c. Expose yourself to risks where you expect to get a return high enough to compensate you for the risk taking.**
- d. Take only those risks where you are guaranteed a good outcome.
- e. Avoid those risks where you feel that there might be a bad outcome

Good luck ❤️