Financial Management
Module 14
August 2012

Solutions

Section A: All three questions to be attempted.
Section B: Two of the following three questions to be attempted.

Section A: All three questions to be attempted

Section A (70 marks in Total)

Question 1 Part (a)

5 marks for costs of the components of capital, 5 marks market value of the components of capital and 3 mark for WACC = 13 marks in total.
Emerald Silicon Technology plc., (EST),

Ignoring the potential new investment, calculate the cost of capital that EST should use as a discount rate when appraising new marginal investment opportunities.

(13 marks)

Costs of Capital

Cost of Equity (using CAPM) = Rf + [Ba x (Rm - Rf)]

Rf = 5%
Rm = 14%
Ba = 1.5

Cost of Equity (using CAPM) = 5% +[1.5 x(14% - 5%)]
= 5% +[1.5 x(9%)]
= 5% +[0.135]
= **18.50%**

The 10% irredeemable debentures:

The yield on this can be estimated solving for Kd in the following perpetuity formula: Po = I / Kd
Kd = the <u>after tax</u> cost of debt
Note: tax of 12.5% must be deducted from the interest payments.
i.e. interest is €5.00 per nominal €100, every six months
Hence after tax payment = €5.00 = (1-0.125) = €4.38 per nominal €100,

Po = I / Kd where: Po = €120.0 and I = €4.38
=> Kd = I / Po = 4.375 / 120 = 3.65% semiannual = **7.29 % annually**

Cost of preference shares

Its preference shares has a €10.00 nominal value
Dividend on the preference shares is 8%
Current market price of the preference shares is €15.00
Cost of preference shares is = Actual Dividend / current market price
= (8% x €10.00) / €15.00
= (€0.80) / €15.00
= 0.05333 = **5.33%**

Market Values of the Capital Structure

The market value of Equity

Current cum div share price	€40.00
Current numbers of shares	500,000
Expected dividend	€2,000,000
Expected dividend per share	€4.00
Current Ex div share price	€36.00
Current Equity Market value	**€18,000,000**

The market value of the irredeemable Debt

= the current market price, (ex interest) per bond x # of bonds issued

The 10% irredeemable debentures

= €120.00 x (€20,000,000 / 100) =

= €120.00 x (200,000) = **€24,000,000**

The market value of the Preference Shares

= the current market price, (ex div) per share x # of shares issued

= €15.00 x (16,000,000 / €10.00)

= €15.00 x (1,600,000)

= **€24,000,000**

In Summary	Cost	Market Value
Ordinary Shares	18.50%	€18,000,000
Irredeemable Debt	7.29%	€24,000,000
Preference Shares	5.33%	€24,000,000
		€66,000,000

Hence the WACC = Ke_g x {E / (E + D+PS)} + Kd x {D / (E + D+PS)}+ Kps x {PS / (E + D+PS)}

= 18.50% x (€18,000,000 / €66,000,000)

+ 7.29% x (€24,000,000 / €66,000,000)

+ 5.33% x (€24,000,000 / €66,000,000)

= 0.050455 + 0.02651 + 0.01939

= 0.096358 = **9.64%**

Alternatively	**After Tax Cost**	**Market Value**	**Number Issued**	**Total Value**	**Proportion**	**% Return**
Ordinary Shares	18.50%	€36.00	500,000	€18,000,000	27%	5.05%
Irredeemable Debt	7.29%	€120.00	200,000	€24,000,000	36%	2.65%
Preference Shares	5.33%	€15.00	1,600,000	€24,000,000	36%	1.94%
				€66,000,000	**100%**	**9.64%**

Question 1 Part b:
2 marks for costs of the components of capital, 2 marks market value of the components of capital and 2 mark for WACC = 6 marks in total.

If EST do go ahead with the investment what effect will this investment have on EST's Weighted Average Cost of Capital, (WACC)? Explain your finding.

Costs of Capital

Cost of Equity (using CAPM) = Rf + [Ba x (Rm - Rf)]

Rf = 5%
Rm = 14%
Ba = 2

Cost of Equity (using CAPM) = 5% +[2.0 x (14% - 5%)]
= 5% +[2.0 x (9%)]
= 5% +[18.0%]
= **23.00%**

The 10% irredeemable debentures:

The before tax yield is given in the question.

(1-t)Kd = the <u>after tax</u> cost of debt

= (1- 12.5%) x 10% = 87.5% x 10% = **8.75%**

Cost of preference shares

Its preference shares has a **€10.00** nominal value

Dividend on the preference shares is **8%**

Current market price of the preference shares is €10.00

Cost of preference shares is = Actual Dividend / current market price
= (8% x €10.00) / €10.00
= (€0.80) / €10.00
= 0.08 = **8.00%**

In Summary	**After Tax Cost**	**Proportion**	**% Return**
Ordinary Shares	23.00%	20%	4.60%
Redeemable Debt	8.75%	55%	4.81%
Preference Shares	8.00%	25%	2.00%
		100%	**11.41%**

Alternatively

Hence the WACC = Ke_g x {E / (E + D+PS)}
+ (1-t)Kd x {D / (E + D+PS)}
+ Kps x {PS / (E + D+PS)}

= 23.00% x 20%
+ 8.75% x 55%
+ 8.00% x 25%
= 4.600% + 4.813% + 2.000% = **11.41%**

As a result of the proposed risk-increasing investment EST's after-tax WACC rises from 9.64% to 11.41%. This result is consistent with expectations. It can be explained by the fact that the increased financial leverage resulted in a higher proportion of debt in the firm's capital structure. The tax-deductibility of the increased proportion of debt is more than compensated for the increased pre-tax costs of each source of financing, thereby raising EST's WACC.

Question 1 Part c)
3 marks for comments on appropriate discount rate and 2 marks for application to question = 5 marks in total.

Only firms with no debt in their capital structure should use the cost of equity to discount project cash flows, and only those projects that are very similar to a firm's existing assets should be discounted using that rate. Firms with both debt and equity should use the WACC as long as they are evaluating a project that is similar to their existing assets. When a firm is making an investment that is very different from its existing investments, then it should not use the company's cost of equity or its WACC.

The cost of debt or the cost of retained profit is never appropriate for use a discount rate.

As EST is considering a major investment that is expected to increase its operating and financial leverage, neither the WACC nor cost of equity should be used.

A project specific cost of capital should be used. One must look at both the opportunity cost of funds and the risk of the project to decide the appropriate cost of capital for this project.

Question 2
Part a: 6 marks for workings and 1 mark for recommendations = 7 marks in all.

The PV of a growing perpetuity may be found using the following formula: PV = C_1 / r – g.
NPV = PV of the benefits – PV of the costs, (in this case the initial investment).

Investment	Maximum allowed Investment	Expected return in Year 1	Expected annual growth	Appropriate discount rate	PV	NPV
A	€ 5,000,000	€ 375,000	12.0%	16%	€ 9,375,000	€ 4,375,000
B	€ 4,000,000	€ 325,000	10.0%	15%	€ 6,500,000	€ 2,500,000
C	€ 3,000,000	€ 300,000	9.0%	13%	€ 7,500,000	€ 4,500,000
D	€ 2,000,000	€ 130,000	8.0%	15%	€ 1,857,143	-€ 142,857
E	€ 1,500,000	€ 120,000	7.0%	12%	€ 2,400,000	€ 900,000
Total	€ 13,500,000					€ 12,275,000

Note: the totals excludes the negative NPV project

According to finance theory a firm with positive NPV projects will be able to get all the financing it needs. In theory lenders and equity investors should be willing and able to invest in all positive NPV projects. Thus Nicholas should invest in ALL four POSITIVE projects, (A to E, excluding D), at a cost of €13.5m and his total NPV will be €12,275,000. As Project D is a negative NPV project it should be rejected. Any surplus funds are better invested in a zero NPV project than a negative one.

Part b: 2 marks for PI and rankings and 2 marks for (i) and 2 mark for (ii) = 6 marks in all.

Investment	Maximum allowed Investment	Expected return in Year 1	Expected annual growth	Appropriate discount rate	PV	NPV	PI	Rank by NPV	Rank by PI
A	€ 5,000,000	€ 375,000	12.0%	16%	€ 9,375,000	€ 4,375,000	1.875	2	3
B	€ 4,000,000	€ 325,000	10.0%	15%	€ 6,500,000	€ 2,500,000	1.625	3	4
C	€ 3,000,000	€ 300,000	9.0%	13%	€ 7,500,000	€ 4,500,000	2.500	1	1
D	€ 2,000,000	€ 130,000	8.0%	15%	€ 1,857,143	-€ 142,857	0.929	5	5
E	€ 1,500,000	€ 120,000	7.0%	12%	€ 2,400,000	€ 900,000	1.600	4	2
Total	€ 13,500,000					€ 12,275,000			

As noted above as project D is a negative NPV project it is ignored and should never be selected. Any surplus funds are better invested in a zero NPV project than a negative one.

As the total required to invest in all projects is €13.5m and funds are only €12.5m then we have so called Capital rationing.

In (i) investments are "divisible" so using the PI, choose projects in the order C, E, A then B until funds are spent.

So invest in projects C, E, A and 75.00%, (€3.0m / €4.0m) of B.
i.e. €12.5m – (€3.0m + €1.5m + €5.0m) = €3.0m
Thus the total expected payoffs (NPV) of our €12.5m investment =
= €4,500,000.00 + €900,000.00 + €4,375,000.00 + (75.00% of €2,500,000.00) =
= €9,775,000.00 + (€1,875,000.00) = €11,650,000.00

In (ii) if projects are non-divisible, linear programming could be used to choose the appropriate combination. Or more simply, since the budget of €12.5m here will allow us to invest in at most three but only three of the projects, choose the three projects with the highest NPVs, projects C, A and B.

All remaining funds, i.e. €1.5m, to be invested in the NPV = 0 projects.
€12.5m – (€3.0m + €5.0m + €4.0m) = €0.5m
Thus the total expected payoffs (NPV) of the Investment fund's €12.5m investment is:
FUND NPV = €4,500,000.00 + €4,375,000.00 + €2,500,000.00 = €11,375,000.00

Part c: 2 mark for capital rationing, 1.5 mark for PI and 1.5 mark for reasons = 5 marks in all.
A situation, in which one is constrained by the availability of funds and cannot invest in every project with a positive NPV, is called capital-rationing. While in theory all positive NPV projects should be accepted in reality, many firms are capital rationed. They cannot get sufficient funds to finance all of their positive net present value projects. Having given out a loan or purchasing a bond, lenders can be unenthusiastic to lend more to the firm. Alternatively the firm may not wish to agree to a downgrade in its bond rating which might accompany more debt. Again, in theory, issuing new equity to invest in positive NPV projects should increase share price. However often this is often not the case. Firms may be reluctant to issue new equity because of the negative signal sent. The firm could be seen as signalling that its stock price is too high, and often experience a decline in market value when they announce a new secondary equity offering.

When one has to choose from a set of possible investments one should choose a combination of projects that maximises shareholder wealth, subject to the constraint of limited funds. A firm facing capital rationing can use profitability index, PI, to select projects. PI adjusts for scale, or size of the initial investment. Firstly all projects are ranked. The decision criteria is to take the project with the highest PI first. If any funds remain, then invest in the project with the second-highest PI, and so on until no more funds are left. This system will allow one to select a portfolio of projects that in aggregate generates a higher NPV than any other combination of projects.

The profitability index assumes that:
- Projects cannot be deferred to a subsequent time.
- Projects are divisible (i.e. portions of a project can be undertaken).
- Capital is rationed in the initial period only.

$$\text{Profitability index} = \frac{\text{Present value of future cash flow}}{\text{Value of initial investment}}$$

All projects with an index value > 1 are acceptable (i.e. they have a positive NPV).
If projects are divisible:
1. Rank projects from highest to lowest profitability index values
2. Choose the projects with the highest index values until available funds are depleted.

If candidates have not already done so in part (b), they should show there workings here of how they chose their selections.
In (i) investments are “divisible”. Using the PI, choose projects in the order C, E, A then B until funds are spent. So invest in projects C, E, A and 75%, (€3m / €4m) of B.

In (ii) as projects are indivisible, choose the combination of projects that gives the highest NPV within the budget. Since the budget of €17.5m here will allow us to invest in at most three but only three of the projects, simply choose the three projects with the highest NPVs, projects C, A and B.

Part d: 3 marks for explanation of Financial Risk, 4 marks for example = 7 marks in all.
Financial risk occurs because many firms borrow capital for investment. Borrowings have an interest cost, and interest charges must be paid. There is a risk, as a firm borrows increasing amounts of capital relative to the size of its equity, that the firm will earn inadequate profits after interest to pay debt interest and have enough profits left over for the shareholders.

For example, suppose that two firms A Ltd and B Ltd each have capital of €1 million. A Ltd is entirely equity financed and B Ltd is 50% financed by a loan whose interest cost is 15% p.a. Each company is identical in every other respect, and each has the following probability distribution of expected profits before interest.

Probability	Profits before interest p.a.
	€
0.3	50,000
0.5	150,000
0.2	250,000

Since B Ltd is part-financed by a loan of €500,000 at 15% p.a., with annual interest charges, there is a 0.3 risk for the firm that its profits won't even be big enough to pay the €75,000 interest cost. With A Ltd, this problem doesn't arise.

The risk to B Ltd from having large borrowings is financial risk. This risk gets bigger as a firm's borrowings get larger relative in size to the firm's equity capital.

Question 3 Part a)
1 mark for initial calculations, 6 marks for lodgement cost calculations and 1 mark for recommendation = 8 marks in all.

Daily sales = Weekly sales / 5 = €75,000 / 5 = €15,000
Each day's lost interest costs (14% / 364) x €15,000 = €5.77

Days interest lost due to alternative lodging strategy

			Mon & Thurs	**Friday Only**	**Tues & Friday**	**Daily**
1	Monday	€15,000	0	4	1	0
2	Tuesday	€15,000	2	3	0	0
3	Wednesday	€15,000	1	2	2	0
4	Thursday	€15,000	0	1	1	0
5	Friday	€15,000	2	0	0	0
6	Saturday	no lodgement				
7	Sunday	no lodgement				
	Total No of days lost interest =		5	10	4	0
	Number of Lodgements =		2	1	2	5
	Annual cost in interest *=		€1,500.00	€3,000.00	€1,200.00	€0
	Annual lodging costs **=		€2,600.00	€1,300.00	€2,600.00	€6,500
	Total annual cost =		**€4,100.00**	**€4,300.00**	**€3,800.00**	**€6,500**

Summary
Based solely on costs the best choice is option 3, which is to lodge on Tuesday and Friday.
The total annual cost will be €3,800.00

*= Cost per day x 5 x 52
**= No of Lodgements per week x €25 x 52

Question 3 Part b)
5 marks each for sections (i) and (ii) and 2 marks for section (iii) = 12 marks in all.

bi) **Only avail of the collection service, average collection period falls to 5 weeks.**

Currrent annual average dedbtors =
= *(Current collection period / days in year) x Annual sales*
= *(10 weeks / 364) x €3,900,000* = €750,000

New annual average dedbtors
= *(New collection period / days in year) x Annual sales*
= (5 weeks / 364) x €3,900,000 = €375,000
Reduction in annual average debtors = **€375,000**

Factoring Charge (2% of Annual sales)	€78,000
less Expenses saved	-€33,000
Net Charge	**€45,000**

Cost as a % of funds advanced €45,000 / €375,000 = 0.1200 **= 12.00%**

bii) **The average collection period falls to 5 weeks and Up-Vision use the finance facilities.**

Funds advanced
= (New collection period / days in year) x Annual sales
= (5 weeks / 364) x €3,900,000 = €375,000

% Advanced	75%	
Gross funds advanced		€281,250
Less		
Commission of 1.5%	-€4,219	
Interest on amount advanced	-€1,893	
		-€6,112
Plus reduction in annual average debtors =		€375,000
Net funds advanced		€650,138

Annual costs

Service charge (from (bi) above	€45,000
Annual Commission	€44,363
= *Commission of 1.5% x (364/35)*	
Annual Interest	€19,688
= *Interest on amount advanced x (364/35)*	
Total net annual factoring costs =	€109,050

Cost as a % of funds advanced = €109,050 / €650,138 = 0.1677 **= 16.77%**

biii) As Up-Vision can borrow on overdraft at 14% p.a. while the collection service costs as a percentage of funds improvement 12% they should use the collection service of the factor. However as the cost of finance advanced as a percentage of funds improvement is 16.77% it should not be used. This is typical, as usually the costs of funds advanced by a factor are more

expensive than regular bank finance and would only be used where difficulties exist in raising regular bank finance.

Section B

Question 4 Part (a): If a company is facing business failure and if it is considering a business re-organisation, briefly outline the strategic business advice (as opposed to any legal advice) you might give. In your answer you should refer to a well-known company / companies that you have learnt from publicly available information that have underwent a business re-organisation to avoid facing business failure and the success or otherwise of the strategies they employed.

5 marks for strategic advice and 3 marks for application, 8 marks in all.

Obviously there are a large variety of acceptable answers here but candidates should be able to discuss and show knowledge of the following and be able to demonstrate their understanding by the use of appropriate real world examples

Currently many companies are struggling to survive, many are suffering corporate failure. If left too late, the choice can often be between an involuntary liquidation by the courts or an orderly winding down of activities. However if the right decisions are undertaken sooner it might be possible to restructure and revive its business fortunes.

Given the legal minefield a company facing business failure will probably need external legal advice. In addition it should undertake a strategic review of its current business and markets. It needs to recognise that its current business model is not working and hence it must decide what (and perhaps who) it needs to change and how and when this change can be implemented?

Its aim must as always be to maximise shareholder value. Hence it must implement a strategy aimed at either preserving and/or enhancing shareholder value.

To do this it will need to follow a process similar to the following:

Start with an initial assessment of the current situation and the reasons for its current difficulties. The aim is to learn from this assessment rather than merely apportion blame!
Undertake a strategic analysis of the business, its markets and its (senior) personnel.
Evaluate its actual and potential business, including realisable values from its current assets and business units if saleable.
Investigate actual and potential sources of finance if it wishes to recapitalise or expand.
Choose the strategy that maximises shareholder value with due regard to the risks of such a strategy.
Implement the most appropriate strategy.
And finally, review its strategy on a regular basis to ensure its new strategy is working and is appropriate as market conditions change.

Question 4 Part (b): In a world of no taxes, with the aid of a diagram, explain Modigliani–Miller "capital structure irrelevance" theorem's Proposition II: $k_e = k_0 + D/E\ (k_0 - k_d)$
Where: k_e is the required rate of return on equity, or cost of equity.
k_0 is the company unlevered cost of capital (i.e. assume no leverage).
k_d is the required rate of return on borrowings, or cost of debt.
D/E is the debt-to-equity ratio.

5 marks for explaining and 2 marks for diagram, 7 marks in all.

The value of a firm is the discounted sum of its future expected cash flows. The cash flows it can expect from the projects it selects are important, along with the firm's risk. The higher the risk, the higher the discount rate applied to those cash flows, the lower the firm value. The firm's discount rate reflects its choice of debt and equity financing. Debt financing is less costly up to a point – at some point the risk of bankruptcy makes debt financing too costly or even unavailable.

The Modigliani–Miller theorem was first proposed by F. Modigliani and M. Miller in 1958 and forms the basis for modern thinking on capital structure. The basic theorem states that, under a certain market price process (the classical random walk), in the absence of taxes, bankruptcy costs, agency costs, and asymmetric information, and in an efficient market, the value of a firm is unaffected by how that firm is financed. It does not matter if the firm's capital is raised by issuing stock or selling debt. It does not matter what the firm's dividend policy is. The value of a firm is determined by (i) the PV of the firms income and (ii) its underlying business risk. Capital structure merely determines how risk is allocated between bondholders and stockholders. Therefore, the Modigliani–Miller theorem is also often called the capital structure irrelevance principle.

Note: While MM's Proposition I is given here for completion there is no need to outline in answer!
Proposition I $V_U = V_L$,
where V_U is the value of an unlevered (ungeared) firm = price of buying a firm composed only of equity, and V_L is the value of a levered (geared) firm = price of buying a firm that is composed of some mix of debt and equity.

Consider two firms which are identical except for their financial structures. The first (Firm U) is unlevered: that is, it is financed by equity only. The other (Firm L) is levered: it is financed partly by equity, and partly by debt. The Modigliani–Miller theorem states that the value of the two firms is the same.

To see why this should be true consider the following: suppose an investor is considering buying one of the two firms; U or L. Instead of purchasing the shares of the levered firm L, he could purchase the shares of firm U and borrow the same amount of money B that firm L does. The eventual returns to either of these investments would be the same. Therefore the price of L must be the same as the price of U minus the money borrowed B, which is the value of L's debt.

This discussion also clarifies the role of some of the theorem's assumptions. We have implicitly assumed that the investor's cost of borrowing money is the same as that of the firm, which need not be true in the presence of asymmetric information, in the absence of efficient markets, or if the investor has a different risk profile to the firm.

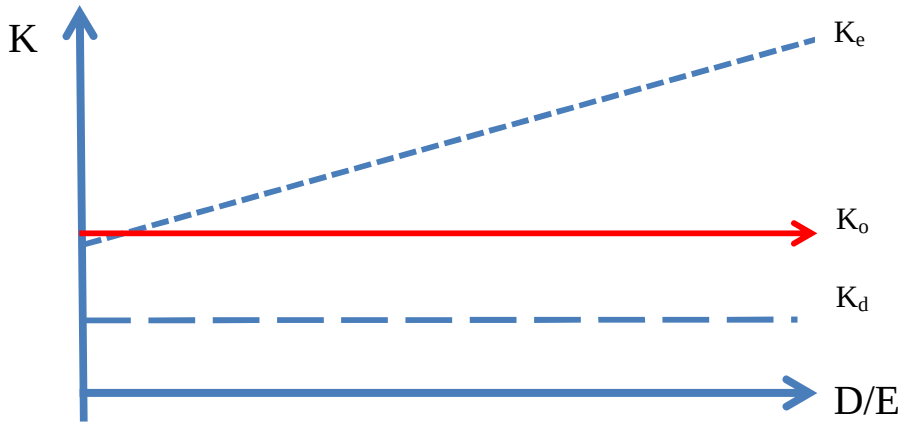
Proposition II:

$k_e = k_0 + D/E\ (k_0 - k_d)$

Where: k_e is the required rate of return on equity, or cost of equity.
k_0 is the company unlevered cost of capital (i.e. assume no leverage).
k_d is the required rate of return on borrowings, or cost of debt.
D/E is the debt-to-equity ratio.

Substituting debt for equity causes the cost of equity to rise, negating any costs savings from the switch. A higher debt-to-equity ratio leads to a higher required return on equity, because of the higher risk involved for equity-holders in a company with debt. The formula is derived from the theory of weighted average cost of capital (WACC). Proposition II, rearranged, is just the WACC. If proposition II holds, WACC is independent of capital structure.

These propositions are true assuming the following assumptions: no transaction costs exist, and individuals and corporations borrow at the same rates.



Proposition II with No taxes and risky debt; as leverage (D/E) increases, the WACC (k_0) stays constant.

This graph illustrates that WACC is independent of capital structure. Since WACC is the discount rate applied to the firm's cash flows, it follows that firm value must remain the same under all capital structures. The cost of equity has a direct linear relationship with the amount of debt in the capital structure. As debt increase, the cost of equity increases.

These results might seem irrelevant (after all, none of the conditions are met in the real world), but the theorem is studied because it tells something very important. That is, capital structure matters precisely because one or more of these assumptions is violated. It tells where to look for determinants of optimal capital structure and how those factors might affect optimal capital structure.

Question 5 Part (a) In managing a bond portfolio explain the impact of maturity and the effects of coupons. In particular explain when an investor might choose low-coupon, long maturity bonds and vice versa?

6 marks for explaining the impact of maturity and the effects of coupons and 2 marks for explaining choice, 8 marks in all.

The inverse relationship between market yields and bond prices is the basis for understanding, valuing and managing bonds. An investor who correctly anticipates changes in market yields can exploit this relationship. The magnitude of change in the capital value of a particular bond in response to a change in market yields will depend on variables that are unique to each bond, i.e. the coupon and the time to maturity.

The impact of maturity: an investor will know that for a given change in market yields, changes in bond prices are directly related to time to maturity.

Note: A mathematical example is not required here and is merely provided for the sake of clarity!
E.g. for a bond with a par value of €100 and an annual coupon of 3.25%, and which matures in three years, assuming that the first coupon payment occurs in exactly one year.

Year	**Cash Flow**	**R = 3%**	**R=4%**
2012	**3.25**	**3.25/1.03 = 3.16**	**3.25/1.04 = 3.13**
2013	**3.25**	**$3.25/(1.03)^2 = 3.06$**	**$3.25/(1.04)^2 = 3.01$**
2014	**103.25**	**$3.25/(1.03)^3 = 94.49$**	**$3.25/(1.04)^3 = 91.79$**
Sum of PV = Price of the Bond =		**€100.71**	**€97.93**

Thus as interest rates increase from 3% to 4% the value of the bond decreases from €100.71 to €97.93, a decline of -2.8%. Once a bond is issued, its price will constantly fluctuate in response to changes in long term interest rates. A rise in interest rates reduces the price of a bond and vice versa. This is a precise mathematical relationship.

Given another bond with exactly the same coupon but with four years to maturity, we can calculate that its value in the same way. Its value falls from €100.92 to €97.29 when the Gross Redemption Yield rises from 3% to 4%, a decrease of not -2.8% but -3.6%. In general this is the case for all longer dated bonds. For any given positive coupon rate an increase in the GRY will cause the value of the bond to decline the longer the bond has left before it matures and vice versa. I.e. other things equal, longer dated bonds are more sensitive to interest changes than shorter dated bonds.

In addition to the maturity effect, the change in the price of a bond as a result of a change in market yields depends on the coupon rate of the bond. Just as with our example above, if the coupon is very high it will result in a higher proportion of expected cash flows being received in the earlier years. Thus a second principle is that bond price volatility and bond coupon rates are inversely related. Other things being equal, high-coupon bonds fluctuate less than low coupon bonds.

The relationship between bond yields and bond price movements was set out by Burton Malkiel in 1962, when he devised a number of theorems such as the effect of time and coupon on bond price volatility we have shown above.

For investors Malkiel's theorems lead to the important conclusion that a decline in interest rates or market yields will cause a rise in bond prices, and the highest volatility will occur in longer-maturity bonds on low-coupon bonds. Therefore:

i) A bond buyer, in order to receive the maximum price impact of an expected fall in interest rates, should purchase low-coupon, long dated bonds.
ii) If an increase in interest rates is expected, an investor already holding bonds should switch into shorter-maturity bonds with high coupons.

Question 5 Part (b) With the aid of three (3) diagrams explain the causes of the shape of the three main patterns created by the "Term Structure of Interest Rates": (i) the Normal (ii) the Flat and (iii) the Inverse Yield Curve.

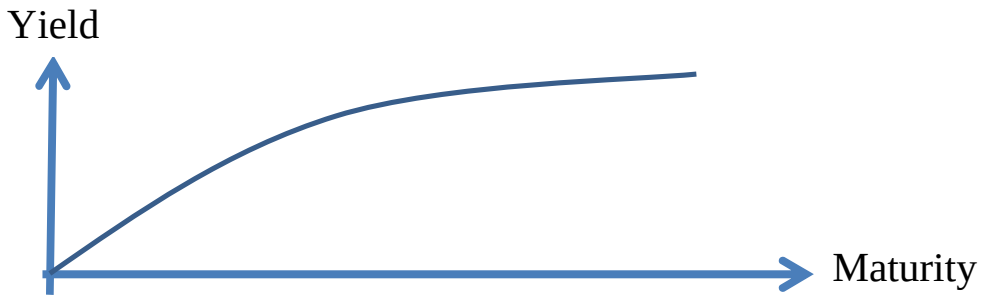
1 mark for showing understanding of a yield curve and 2 marks each for explaining the 3 curves, 7 marks in all.

The term structure of interest rates, also known as the yield curve, is a very common bond valuation method. Constructed by graphing the yield to maturities and the respective maturity dates of benchmark fixed-income securities, the yield curve is a measure of the market's expectations of future interest rates given the current market conditions. Bonds, issued by governments with stable finances, are considered risk-free, and as such, their yields are often used as the benchmarks for fixed-income securities with the same maturities. The term structure of interest rates is graphed as though each coupon payment of a non-callable fixed-income security were a zero-coupon bond that "matures" on the coupon payment date. The exact shape of the curve can be different at any point in time. So if the normal yield curve changes shape, it tells investors that they may need to change their outlook on the economy.

There are three main patterns created by the term structure of interest rates:

1) Normal Yield Curve: As its name indicates, this is the yield curve shape that forms during normal market conditions, wherein investors generally believe that there will be no significant changes in the economy, such as in inflation rates, and that the economy will continue to grow at a normal rate. During such conditions, investors expect higher yields for fixed income instruments with long-term maturities that occur farther into the future. In other words, the market expects long-term fixed income securities to offer higher yields than short-term fixed income securities. This is a normal expectation of the market because short-term instruments generally hold less risk than long-term instruments; the farther into the future the bond's maturity, the more time and, therefore, uncertainty the bondholder faces before being paid back the principal. To invest in one instrument for a longer period of time, an investor needs to be compensated for undertaking the additional risk.

As general current interest rates increase, the price of a bond will decrease and its yield will increase.

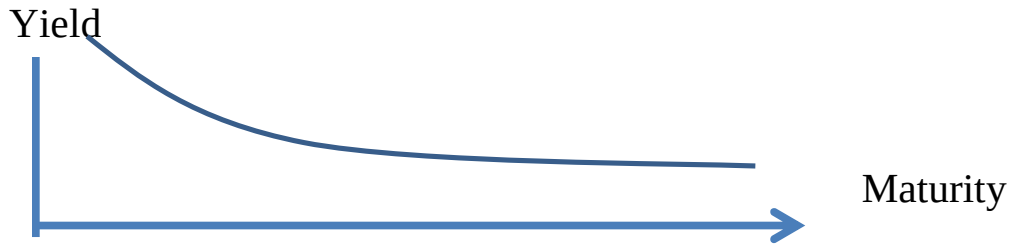


2) Flat Yield Curve: These curves indicate that the market environment is sending mixed signals to investors, who are interpreting interest rate movements in various ways. During such an environment, it is difficult for the market to determine whether interest rates will move significantly in either direction farther into the future. A flat yield curve usually occurs when the market is making a transition that emits different but simultaneous indications of what interest rates will do. In other words, there may be some signals that short-term interest rates will rise and other signals that long-term interest rates will fall. This

condition will create a curve that is flatter than its normal positive slope. When the yield curve is flat, investors can maximize their risk/return trade-off by choosing fixed-income securities with the least risk, or highest credit quality. In the rare instances wherein long-term interest rates decline, a flat curve can sometimes lead to an inverted curve.

3) Inverted Yield Curve: These yield curves are rare, and they form during extraordinary market conditions wherein the expectations of investors are completely the inverse of those demonstrated by the normal yield curve. In such abnormal market environments, bonds with maturity dates further into the future are expected to offer lower yields than bonds with shorter maturities. The inverted yield curve indicates that the market currently expects interest rates to decline as time moves farther into the future, which in turn means the market expects yields of long-term bonds to decline. Remember, also, that as interest rates decrease, bond prices increase and yields decline.

You may be wondering why investors would choose to purchase long-term fixed-income investments when there is an inverted yield curve, which indicates that investors expect to receive less compensation for taking on more risk. Some investors, however, interpret an inverted curve as an indication that the economy will soon experience a slowdown, which causes future interest rates to give even lower yields. Before a slowdown, it is better to lock money into long-term investments at present prevailing yields, because future yields will be even lower.



Question 6 Part a)
5 marks for discussing financial future contracts and how they are used to hedge a position.

A futures contract is a derivative product that is a type of forward but traded on a futures exchange. It is generally used, like a forward contract to reduce risk. It can though be used to take on risk. This would be speculation! It is as a standardised arrangement between two parties today to buy or sell an asset at a particular time in the future for a particular price agreed today. The difference between a forward and a future contract is like that between buying a made to measure suit and buying “ready-to-wear” (or “Prêt-à-porter” as they say in France). The advantage of buying “made to measure is a perfect fit. The disadvantage is the price you pay for this. The advantage of a futures contract is that it is comparatively cheaper and this may outweigh the fact that it may not be a perfect fit.

It is not necessary that the underlying asset to a futures contract be a traditional “real” commodity. For financial futures, the underlying asset can be an intangible assets or referenced items such as stock indexes and interest rates. Futures for currencies, securities or financial instruments are all traded on futures exchanges.

Like a forward contract, a futures contract can be used to counterbalance risk exposure. It can limit any adverse change in the value of the underlying asset. In theory a futures contract can be used to hedge a position perfectly and completely remove all risk. In reality this is it is difficult to achieve a perfect hedge. They are therefore used not to completely eliminate but to reduce risk as much as possible. The price of a future contract is determined by the equilibrium between the supply and demand for them. This comes about through the competing buy and sell orders on an exchange at a particular time.

The party agreeing to buy the underlying asset in the future assumes a long position, and the party agreeing to sell the asset in the future assumes a short position. If you know that you will be making a purchase in the future of a certain asset, you should take a long position in a futures contract to hedge your position. For example, suppose that you know that in 3 months time you will have to buy US dollars to pay a supplier. By buying the futures contract today, you can lock in the price offered on the futures exchange today for dollars in three months time, (or thereabouts if not a perfect hedge). This reduces your risk because you will be able close your futures position and buy the US dollars you will need in three months at the price agreed today.

If you know that in the future you will be selling a certain asset, you should take a short position in a futures contract to hedge your position. For example, suppose that you know that in 3 months time you must sell US dollars you will make from an export sale. By selling the futures contract today, you can lock in the price offered on the futures exchange for the euro-dollar exchange rate in three months time, (or thereabouts if not a perfect hedge). This reduces your risk because you will be able close your futures position and sell the US dollars you will receive in three months at the price agreed today.

Thus the uncertainty about the future price of an item is reduced which makes trading easier. Futures contracts can be very useful in limiting the risk exposure that an investor takes on in business. The main advantage of participating in a futures contract is that it removes or reduces risk by locking in the price of whatever you are buying or selling.

Question 6 Part b)
5 marks for discussing Interest rate swaps and how they are used to hedge a position.

Interest rate swaps, being usually OTC as opposed to exchange traded financial instruments, can come in a huge number of varieties. As the market for interest rate swaps is large and highly liquid they can be specifically structured to meet whatever the counterparties need. In reality as opposed to theory, financial markets are not perfect. Two parties can have an advantage in different aspects of the global financial market. Interest rate swaps can allow them to take advantage of these differences more efficiently. Interest rate swaps can now be traded as an Index through the FTSE MTIRS Index.

An interest rate swap is a derivative in which one party exchanges a stream of interest payments for another party's stream of cash flows for a particular principal amount. However, while the principal amount is the same for both sides of the currency the principal amount itself is not actually exchanged. An interest rate swap is an agreement between two parties to exchange aspects (namely the interest payments) of a loan. At the outset, these aspects should be equivalent in net present value terms, i.e. the swap should have a NPV = 0 when initiated.

The simplest type of interest rate swaps are known as “Fixed for Floating” and involves a fixed payment being exchanged for a floating payment that is pegged to a variable reference interest rate such as, for the Euro zone, the Euribor. Euribor is the Euro Interbank Offered Rate and is a daily reference rate based on the averaged interest rates at which banks offer to lend unsecured funds to other banks in the euro wholesale money market (or interbank market). “Fixed for Floating” interest rate swaps can allow both parties to benefit. This is due to the varying levels of creditworthiness in the counterparties. This gives rise to a positive quality spread differential and it is this differential which can give rise to arbitrage opportunities.

Interest rate swaps can be used by hedgers to manage their fixed or floating assets and liabilities in either the same or differing currencies. Or they can be used by speculators to profit from changes in interest rates. Interest rate swaps however expose users to interest rate risk and credit risk. Interest rate risk is due to changes in the floating rate. For example, if we had a plain vanilla fixed-for-floating swap, if we were the party who was paying the floating rate we would benefit if interest rates fell. For hedging purposes our interest rate exposure position would be the same as if we held a long bond position.

Credit risk or counter party risk, the risk that the other party will fail to meet its obligations depends on whether the swap is “in the money”. If it is, then we face the credit risk of a possible default by the other side and vice versa for them.

Swaps can help you to hedge against an interest rate exposure by reducing the uncertainty of future cash flows. A swap can allow you to change your debt conditions and thus you can take advantage of current or expected future market conditions.

They help to eliminate or manage exposure to fluctuations in interest rates or to acquire a lower interest rate than a company would otherwise be able to obtain. Swaps are often used because a domestic firm can usually receive better rates than a foreign firm. They are used as financial tools to lower the amount needed to service a debt.

Question 6 Part c)
5 marks for discussing the pecking order for financing

Finance theory would suggest that a firm should aim to maximise shareholder wealth. It can do this by choosing a debt-equity mix that minimises its WACC and taking on all positive NPV projects. As debt is generally cheaper than equity, there should be a preference towards debt in the capital structure. Yet as retained earnings are simply a form of equity, why in reality does the proportion of equity in the form of retained earnings in the capital structure seem so high? Similarly it has been observed that firms that seek to increase the amount of debt in the capital structure often see a rise in the value of the firm in the stock market. The pecking order for financing argument tries to explain this.

The pecking order for financing argument explains why profitable companies that do not need external finance only borrow a little. They are simply not looking at optimal debt equity ratios. They can use their retained earnings to fund all potential growth opportunities without recourse to the capital markets.

The pecking order for financing argument is that managers do not try to reach the theoretical optimal capital structure. They prefer to use internally generated undistributed profits than go to external sources of finance. Managers seek to use internally generated funds first because this avoids the time consuming and burdensome task of seeking external finance. Unfortunately it also however avoids the discipline involved in justifying why an external investor should lend or invest in the firm.

Only if a firm needs more funds than are available from retained earnings for potentially profitable investments, will it go to the capital markets.

According to the pecking order for financing argument because debt is first in the pecking order of externally raised finance the firm will only go to the stock market to raise fresh equity finance as a last resort. Thus internally generated equity is at the top of the pecking order and externally generated equity at the bottom.

Managers and others have suggested that choosing to issue new shares is a last resort because of the negative “signalling” effect. The argument is that due to asymmetric information, the stock market will feel that a new equity issue is a signal that managers know the shares are overvalued. Hence a new shares issue could be a danger signal that the firm is or will be in trouble. The market might suspect that management is trying to bolster the firm’s capital structure in advance of bad news ahead.

Again according to the pecking order for financing argument managers choose External debt over external equity because obtaining external debt is cheaper, it is quicker to obtain, it requires less information to be publicly released and debt is less burdensome on management to obtain than issuing new shares on the stock market.

Finally issuing new ordinary shares is more expensive than issuing new debt capital, which in turn is more expensive than simply using retained earnings. The costs of new issues of debt and rights issues of shares can be very expensive, whereas retained earnings are available without issuing costs.

Question 6 Part d)
5 marks for discussing difference between earnings yield and dividend yield as company valuation methods.

Earnings yield is the amount of earnings per share divided by the share price. It is the reciprocal of the P/E ratio. The earnings yield is quoted as a percentage, and is useful in comparing a stock, sector, or the market's valuation relative to bonds.

The earnings yield is also the cost to a publicly traded company of raising expansion capital through the issuance of stock. It is computed as (Earnings Per Share / Market Price Per Share). The earnings yield is quoted as a percentage, allowing an easy comparison to going bond rates.

The dividend yield or the dividend-price ratio on a company stock is the company's annual dividend payments divided by its market cap, or the dividend per share, divided by the price per share. It is often expressed as a percentage.

The reciprocal of the divided yield is the Price/Dividend ratio. The dividend yield is related to the earnings yield via:

Earnings yield = dividend yield * dividend cover, and
Dividend yield = earnings yield * dividend payout ratio.

Unlike preferred stock, there is no stipulated dividend for common stock. Instead, dividends paid to holders of common stock are set by management, usually in relation to the company's earnings. There is no guarantee that future dividends will match past dividends or even be paid at all.

Due to the difficulty in accurately forecasting future dividends, the most commonly-cited figure for dividend yield is the current yield which is calculated using the following formula:

Current Dividend Yield = most recent full-year dividend / current share price.

Rather than using last year's dividend, some try to estimate what the next year's dividend will be and use this as the basis of a future dividend yield. Such a scheme is used for the calculation of the FTSE UK “Dividend+” Index. Estimates of future dividend yields are by definition uncertain.

Question 6 Part e)
5 marks for discussing difference between the approaches to corporate governance in the UK, (same as Ireland) and the US.

Corporate governance is a means to an end and not an end in itself. Good corporate governance promotes economic activity and prosperity by inspiring trust in companies and corporations so that people have confidence to do business and invest.

As a subject, corporate governance is the set of processes, customs, policies, laws, and institutions affecting the way a corporation is directed, administered or controlled. Corporate governance also includes the relationships among the many stakeholders involved and the goals for which the corporation is governed.

It is widely believed that the US and the UK (and Ireland) share an Anglo-American approach to corporate governance. Indeed common language, similar ownership structures, high levels of transparency and unitary board models would seem to justify such an assumption.

However in the UK and Ireland the approach to corporate governance tends to be one of rules with which firms must “comply or explain” if not. In other words these rules are not legally binding. Failure to observe them may result in issues with the financial markets but not with the law.

In the United States the approach to corporate governance tends to be legal. US corporations are directly governed by state laws, while the exchange (offering and trading) of securities in corporations (including shares) is governed by federal legislation.

There has been much interest in corporate governance, particularly due to the high-profile collapses of a number of large corporations, most of which involved accounting fraud. Corporate scandals of various forms have maintained public and political interest in the regulation of corporate governance. In the U.S., these include Enron Corporation and MCI Inc. (formerly WorldCom). Their demise is associated with the U.S. federal government passing the Sarbanes-Oxley Act in 2002, intending to restore public confidence in corporate governance. In the UK since the establishment of the Cadbury Committee in 1991, there have many reports on and developments in corporate governance area.

Many U.S. states have adopted the Model Business Corporation Act, but the dominant state law for publicly-traded corporations is Delaware, which continues to be the place of incorporation for the majority of publicly-traded corporations. Individual rules for corporations are based upon the corporate charter and, less authoritatively, the corporate bylaws. Shareholders cannot initiate changes in the corporate charter although they can initiate changes to the corporate bylaws.

In the UK, board directors are responsible for directing the affairs of the company and are accountable to shareholders for the stewardship of their investment. The fact that UK shareholders have the authority to appoint or remove a director encourages an environment where the use of such power is rarely needed. The threat alone is sufficient to ensure that boards take shareholders’ concerns seriously and are sensitive to shareholder opinion on governance matters.

In contrast, US shareholders can do little to influence board composition except to withhold votes to signify their dissatisfaction. In fact, shareholders in the US have little redress in holding boards to account save for resorting to litigation or, provided that their portfolios are not index-linked, selling their shares.

There is a higher concentration of shareholding among fewer institutions in the UK compared with the US, which has led to unique engagement behaviour. Close proximity of institutions facilitates an organised and generally cohesive approach to engagement. The UK regulatory environment supports shareholder collegiality by permitting dialogue between boards and investors and not presuming that such dialogue represents privileged disclosure, which is restricted by fair disclosure regulation in the US; allowing dialogue among investors without triggering concert party issues; and it is free of the divisive threat of class action litigation.

In contrast, the sheer size of the US markets and the greater number of institutions mean that mobilising shareholders to defend collective interests is more difficult.

Question 6 Part f)
Co-efficient of Correlation as it relates to the two stock portfolio:
1 marks for outlining the co-efficient of correlation, 1 mark for effects on return and 3 marks for effects on risk and in a 2 stock portfolio = 5 marks in all.
The co-efficient of correlation, "r" or in Greek "ρ" "Rho", is a measure of the strength and type (positive or inverse) of the relationship between two variables. For a two stock portfolio the co-efficient of correlation shows how the returns on each of the stocks co vary with each other. It is determined by a mathematical analysis of past returns on the two shares.

In a two stock portfolio the co-efficient of correlation does not appear in (and hence does not effect) the equation for the return of the portfolio $E(Rp) = x_1R_1 + x_2R_2$ where x_1 and x_2 are the weights of asset 1 and 2 respectively in the portfolio.

However "r_{12}" "Rho_{12}", (the correlation of stock 1 with stock 2), does appear in the equation for the Standard Deviation of a two asset portfolio. The standard deviation is a measure of the total risk of that portfolio. Hence the co-efficient of correlation does affect the risk of that portfolio.
E.g. for a two asset portfolio, the Standard Deviation (= "the total risk of the portfolio")
$= s_P = \sqrt{\{x_1^2 s^2_1 + x_2^2 s^2_2 + 2\, x_1 x_2\, r_{12}\}}$

The range of values of the co-efficient of correlation is from -1, (perfect negative correlation i.e. if stock 1 increased by 10% then stock 2 would decrease by 10% and vice versa), to +1, (perfect positive correlation i.e. if stock 1 increased by 10% then stock 2 would increase by 10% and vice versa). Zero correlation would imply no correlation between the two stocks. In general most shares tend to be positively correlated to each other to some degree, as the price of stock 1 increase, stock 2 increases too and vice versa.

An example of shares likely to have a strong positive correlation would be those in similar industries e.g. Ryan Air PLC and Aer Lingus PLC. An example of shares likely to have a strong negative correlation would be those in industries that performed best at opposite ends of the economic cycle e.g. a luxury goods manufacturer such as LVMH and a firm that specialises in insolvency work.