EXAMINATION

April 2005

Certificate in Practical Financial Economics

EXAMINERS' REPORT

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

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Chairman of the Board of Examiners

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1 (i)

- Investors are risk averse individuals who maximise expected utility of wealth
- Investors all have the same view of asset returns
- Asset returns follow a joint normal distribution
- There exists a risk free rate

(ii)

- According to the CAPM the total risk of a risky security is measured by the variance.
- Systematic risk is measured by the covariance of the return on the risky security with the market.
- Only systematic risk is relevant to the pricing of a risky security, the excess of total variance over systematic risk can be diversified away.

(iii) According to the CAPM, the expected return on a single risky stock (or a well diversified portfolio) is given by:

$R = R_f + \beta(R_M - R_f)$

Where R_f is the risk free rate, R_M is the expected market return and β is the covariance of the return of the risky stock (or well diversified portfolio) with the market, divided by the market variance.

For ABC we have:

$0.085 = R_f + 0.7(R_M - R_f)$, so $0.085 = 0.3R_f + .07R_M$

For the 100 share portfolio:

$0.105 = R_f + 1.1(R_M - R_f)$, so $0.105 = -0.1R_f + 1.1R_M$

Which is consistent with $R_f = 0.05$ and $R_M = 0.1$

(iv) The student's reasoning is flawed because what counts in the determination of expected return is β, not standard deviation (or, equivalently, variance).

The student believes that the higher standard deviation of ABC (not surprisingly higher than the standard deviation of the 100 stock portfolio, which is well diversified) justifies a higher return for ABC.

In fact ABC has a lower β than that of the 100 share portfolio and so, R_f and R_M being the same for both, the return on ABC should be lower.

2 (i) Within this context, "not acting in shareholders' best interests" is equivalent to not maximising shareholder value.

In making decisions, empire builders may make choices that increase their influence on the business rather than making the choices that maximise shareholder value.

If management are reluctant to take risks, they may be reducing shareholder value by avoiding risky projects with positive NPV.

(ii) (a) It encourages managers to maximise NPV.

They are encouraged only to invest if the increase in earnings is enough to cover the cost of capital.

(b) A project with an initial outlay can result in negative residual income, even if the project has a positive NPV.

Investment in new technology may be such a project, so the point being made by shareholders is valid.

One way around the problem may be to refine the definition of profit, perhaps by treating investment in new technology as an investment to be written off over a reasonable period rather than as an immediate expense.

3 (i) Three forms of market efficiency are:

- Weak: all information about past prices is in the share price
- Semi-strong: all publicly available information is in the share price
- Strong: all information (including insider information) is in the share price

(ii) A
No advantage under weak form of efficiency.
No advantage under strong/semi-strong forms of efficiency
Perhaps some advantage in inefficient markets

B
No advantage in semi-strongly efficient markets
No advantage in strongly efficient market
Some advantage in inefficient or weakly efficient markets

C
No advantage whatever the level of market efficiency

No worse than any other strategy in strongly efficient market.

D
No advantage in strongly efficient market
Some advantage in semi-strongly or weakly efficient market or in inefficient market.

Although no marks were awarded for pointing out any ethical issues with insider trading, this does not mean that this practice is condoned by the examiners.

4 (i) (a) The utility function U is a function of investor wealth W.

- The risk lover's graph is convex since an increase in wealth increases utility more than an equivalent deduction in wealth reduces utility
- The risk neutral investor's graph is a straight line since an increase in wealth increases utility by the same amount that an equivalent reduction in wealth reduces utility.
- The risk averse investor's graph is concave since an increase in wealth increases utility less than an equivalent reduction in wealth reduces utility

(b) More wealth is preferred to less so $dU / dW > 0$, i.e. all graphs are upwards sloping

(ii) $dU / dW = 100{,}000 / W^2 > 0$, so U is a valid utility function

The graph of $U(W)$ against W is concave so U is the utility function of a risk averse investor.

(iv) Suppose we have possible wealth outcomes of W_1 and W_2, with respective probabilities p and $1 - p$. The expected wealth arising from such a "gamble" is $pW_1 + (1 - p)W_2$

The utility of the gamble is then given by $pU(W_1) + (1 - p)U(W_2)$, which is in the form of a statistical expectation.

Since the investor is risk averse his utility function is concave. The utility of his expected wealth ($= U(pW_1 + (1 - p)W_2)$) is then greater than his expected utility.

(v) The expected loss in house value = (0.05*0.5 + 0.1*0.2)*100,000 (a zero loss has 85% probability) = £4,500

The investor's expected wealth is then £95,500 (= £100,000 – £4,500)

The expected utility $= 0.05U(50{,}000) + 0.1U(80{,}000) + 0.85U(100{,}000)$
$= 0.05(-2) + 0.1(-1.25) + 0.85(-1)$
$= -1.075$

This level of utility corresponds to wealth $W = 100{,}000 / 1.075 =$ £93,023 (to the nearest pound)

The expected utility is less than the utility of the investor's expected wealth because the investor is risk averse. The investor will increase his utility through insurance as long as his certain wealth, after paying for the insurance premium, exceeds £93,023. The maximum risk premium, in excess of the expected loss, is then £95,500 – £93,023 = £2,477

5 (i) The key point is that the non-profit liability may be considered as risk free debt.

The appropriate form of the Miller Modigliani equation is then:

$R_e = R_a + V_e / V_d (R_a - R_f)$, where R_f is the risk free rate, R_a is the return on the assets and V_e and V_d the value of equity and debt respectively.

$R_f = 0.05$ and $R_a = 0.1$
$V_d = 80 / 1.05 = 76.2$
$V_e = 100 - 76.2 = 23.8$ (since $V_a = V_e + V_d$)
Hence $R_e = 0.1 + 76.2 / 23.8 (0.1 - 0.05) = 0.26$

(ii) The non–profit liability may now be regarded as risky debt

Since, according to Miller Modigliani, a firm's total cash flows are not affected by capital structure (ignoring tax) the impact of risky debt is to increase the share of cash flows available to equity shareholders. Therefore the risk discount rate should decrease.

(iii) (a) The franchise value of a life company is the excess of market value over the "net worth", or the market value of balance sheet assets less liabilities. (In (i) above net worth is 23.8). The franchise value is then the present value of the shareholder's interest in new, rather than existing, business.

(b) If the capital available is small then the new business prospects of the insurance company are likely to be adversely affected since there will be concerns that insolvency could arise. Thus franchise value will be reduced or even destroyed.

At higher levels of capital franchise value will be restored to a normal level, i.e. at a level where likely new business prospects are consistent with the capital required.

As even more capital is added franchise value is unlikely to increase further.

6 (i) (a) Corporate structure

- Company
- Usually listed on the Stock Exchange
- Funded by equity and debt capital

(b) Main parties involved

- Board of directors, who are responsible for the policy of the company
- Investment managers: manage the investments for the investment trust
- Shareholders, who buy and sell the shares in the investment trust company in the same way as they would in any other company

(c) How the price of shares are determined

- Supply and demand
- (or could say by the market)

(ii) The answer needs to be in the form of a note, not just in bullet point form.

The main points are:

- Yes, investment trusts do commonly trade at a discount to their net asset value:
  - mainly due to the asset management charge (usually expressed as a % of the value of the assets per annum)
  - marketability — small trust might not have a very liquid market
  - Day trading is looking for short term moves — not arbitrages
  - If investment trusts were mispriced then it would be an arbitrage strategy that would lock in the profit — Therefore there should be no benefit from day trading (for the two reasons)

7 (i) The steps required are:

- Make a preliminary high-level risk analysis
- Hold a brainstorming session, including both internal management and relevant external people, to identify organisational risks. This forms the basis of the risk register
- Do a desktop analysis including industry sources (further analysis) to supplement the initial results
- Set out the identified risks in a risk register

Categories of risk

Suggested categories:

- Political
- Business
- Economic
- Natural (e.g. weather related)
- Financial (or market — not both)
- Crime/Fraud

Others could include:

- Group
- Operational
- Liquidity

Information on each of the risks:

- Title
- Description
- Category
- Severity risk
- Frequency risk
- Mitigation strategy in place
- Rank
- Who monitors this risk (i.e. the responsible person)
- Key risk indicator — how the risk is monitored

How to determine if a risk is worthy for inclusion:

- All material risks should be included (considering the likelihood and the severity)

(ii) Exposure to US dollar exchange rate movements

- hedging through currency futures, forwards or options; or
- keeping $US cash reserves based on future expected requirements

Exposure to Brazilian political risk

- Political risk insurance
- Using alternative countries for the raw materials
- Keep close eye on political developments

Strikes in your manufacturing plants

- Avoid — Seek to address the underlying causes of the strikes
- Minimise — Keep a higher inventory than otherwise
- Minimise — Have good shipping arrangements from other manufacturing countries

8 (i) At time 0,
$1.492p_{up} + 0.670 (1 - p_{up}) = 1.06$
$p_{up} = 0.474$

At time 1 in top state,
$2.226p_{up} + 1 (1 - p_{up}) = 1.492 * 1.06$
$p_{up} = 0.474$

At time 1 in down state,
$1p_{up} + 0.449 (1 - p_{up}) = 0.670 * 1.06$
$p_{up} = 0.474$

[use formula of form $V_{up}p_{up} + V_{down}p_{down} = V_{start} * 1.06$]

(ii) Cashflows net of salary and bonus are:

			0
		1.226	
	0.492		0
0		0	
	(0.330)		0
		(0.551)	
			0

Without the cancellation option, value at a particular node just after cashflows is:

$\{V_{up}p_{up} + V_{down}p_{down}\} / 1.06$

where V_{up} and V_{down} are values before cashflows at adjoining nodes
and value just before cashflows is
Value after cashflows plus cashflows

Putting these formulae through the tree, with top figure at each node being value before cashflow and bottom figure being cashflow afterwards…….

			0
			0
		1.226	
		0	
	1.040		0
	0.548		0
0.166	0		
0.166		0	
	(0.603)		0
	(0.273)		0
		(0.551)	
		0	
			0
			0

So without cancellation option, value of the Dali contract is €166,00

With the cancellation option, value at a particular node just before cashflows is:

Max[$\{V_{up}p_{up} + V_{down}p_{down}\} / 1.06$ + cashflows, – canc'n cost]

where V_{up} and V_{down} are values before cashflows at adjoining nodes

Value just after cashflows is value before less cashflows (which will be zero if contract is cancelled)

			0
		0	
		1.226	
		0	
	1.040		0
	0.548		0
0.178	0		
0.178		0	
	(0.578)		0
	(0.248)		0
		(0.5)	
		0	
			0
			0

In the above tree, nodes in italics have been changed from previous version. Node in bold is where Dali's contract is not renewed. Note that in year one bottom state, contract is renewed even though Dali is a liability.

So, with cancellation option, value of Dali contract is €178,000

(iii) Value of the option is the difference

i.e. 178k – 166k = €12,000

(iv) Other real options:

- Value of follow-on investment opportunities, e.g. option to extend contract or possibility of attracting more surrealist painters

- Timing option, i.e. option to delay signing for another year while assessing demand for shirts with surrealist painters' names on them

- Flexibility option, e.g. option to diversify from football into selling paintings, etc.