

Topics in Financial Economics: Corporate Finance and Markets

Time Allowed: 1.5 hours.

Answer **ONE** question from **SECTION A** and **ONE** question from **SECTION B**. All questions carry equal marks. Answer Section A questions in one booklet and Section B questions in a separate booklet.

Read carefully the instructions on the answer book provided and make sure that the particulars required are entered on each answer book. If you answer more questions than are required and do not indicate which answers should be ignored, we will mark the requisite number of answers in the order in which they appear in the answer book(s): answers beyond that number will not be considered.

Section A: Answer ONE question

1. A major University is considering investing in a renewable energy project to generate electricity from the hot air emitted during lectures. The project will cost £50,000,000 – this is not expected to change if the project is delayed. The current price of energy is £40 per unit and the cost of generation (professorial salaries, etc.) is £25 per unit of electricity generated. The annual quantity of energy generated is 300,000 units. The riskless discount rate (which is also the cost of capital) is 5%. All of these data are assumed to stay the same forever.

(a) What is the NPV if the project is undertaken now? **(10 marks)**

Now suppose that the price of electricity will change next year: increasing or decreasing by 25% with equal probability (and staying at the new value forever).

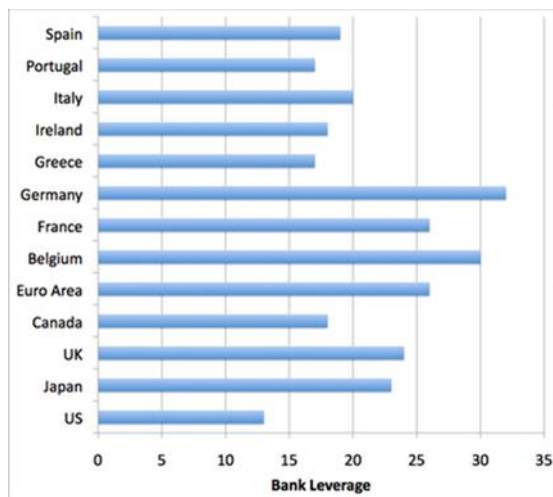
(b) What is the NPV if the final decision to undertake the project – and the start of the project – is postponed to one year from now? **(15 marks)**

(c) When (if at all) should the project be undertaken and what is the option to delay the decision for one year worth? **(10 marks)**

(Question 1 continued)

- (d) How would the University's optimal decision (i.e. invest now, wait or reject the project) change as the following parameters change? [hint: consider increases and decreases and *at least* give qualitative answers e.g. "if X goes up enough the University will switch from choice A to choice B"]
- If the current price was higher or lower than £40? [assume that future prices go up or down by 25% from whatever the current price is – e.g. if the current price were £50 the 'high price' would be £62.5 and the 'low price' would be £37.5] **(5 marks)**
 - The amount of hot air emitted by the professors (the quantity of energy generated per period)? **(5 marks)**
 - The riskless interest rate? **(5 marks)**

2. The Modigliani-Miller results on the irrelevance (to firm value) of corporate financial policy (leverage and dividends) suggest that the firm's corporate financial structure should not affect the firm's value. In the run-up to the Eurozone crisis, banks became highly leveraged (the Figure below, from the IMF April 2011 global stability report, shows bank leverage – the ratio of debt to banks' total capital – for various countries).



This has several implications. Even modest changes in asset values have enormous impacts on banks' equity and the required return on such risky assets has been very high. There is also a perception of systemic risk because highly-leveraged banks (or countries) facing possible bankruptcy will have to sell assets to pay interest just when asset prices are falling. Please comment on the relevance of the Modigliani Miller propositions for the banking sector and/or the Eurozone crisis. Do high levels of debt have a useful disciplinary effect, or should banks be forced to hold more equity? **(50 marks)**

Section B: Answer ONE question

3. Public discussion around executive salaries seems agreed on the undesirability of 'rewarding failure'. However, it is not obvious what failure means, especially in a global recession. The following question asks you to consider various approaches to the problem. It draws on theoretical models developed during the course, but does not require you to reproduce the formal models or carry out any calculations. Suppose that the shareholders of a firm take up the governments' challenge actively to monitor the CEO's performance. The profit earned by the firm, Π , is known to everyone, but the cost, C , of running the firm is known only to the manager (who has an outside option worth 0). [In answering, you may find it useful to refer to models discussed in lecture.]

- (a) First, suppose that C is known only to the manager, but does not depend on managerial effort. If the shareholders can find out the true cost for a charge of D , what form will the optimal contract take? **(15 marks)**
- (b) Now suppose the firm's cost depends on the use of outside inputs and managerial effort, which are substitutes. There are many similar firms: a proportion of them are run to maximise profit, but the other managers maximise their own utility (taking the cost of effort into account). Managers know the unit cost of outside inputs, the amount used and the amount of effort they supply; their shareholders know only the firm's revenue and cost. What is the optimal contract likely to look like if input cost is independently distributed across firms? How would the result differ if the input cost were correlated across firms? Will the proportion of profit-maximising firms tend to go up or down? **(20 Marks)**
- (c) Finally, suppose that the profits of the firm depend on purchases of specialised services from an outside consultancy. The value of such services (and thus the amount needed for maximal profit) depends on the state of the world, which is known only to the manager. The manager owns shares in the consultancy and receives a proportion of the money paid by the firm to the consultancy in the form of dividends). The Board has to ask the manager about the amount of services to commission and knows that the manager benefits from larger contracts than are strictly necessary. What form would the optimal contract take, and how does this depend on the size of the manager's ownership stake in the consultancy? **(15 Marks)**

4. "Short selling and high-speed trading using automated quantitative models are destabilising to financial markets and should be limited or banned." Discuss. **(50 marks)**
