Module 3 Assignment



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Question 1

Explain why is it that a company that takes all projects that have positive NPV will end up maximizing shareholder value. Why is market efficiency an important condition behind the equivalence of NPV and shareholder value maximization ? (1 paragraph)

NPV is the sum of future cash flows discounted to the current period. Stock price is the sum of all future cash profits discounted to the current period.The more efficient the market the greater the likelihood they will converge. Inefficiency in the market will probably lead to differences in the two. Maximising NPV maximises shareholder wealth

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #1 below.

* **10 pts - 10 points for a reasonable answer that is based on the arguments that we discussed in the lectures**
* 5 pts - 5 points for an incomplete answer or a correct answer that is too long (longer than 1 paragraph)

Question 2

Does the NPV rule (take all positive NPV projects) guarantees that a company will make socially responsible investments ? You may need to recap lecture 1 to answer this question. (1 paragraph)

A positive NPV will not guarantee socially responsible investments. There is often a conflict between an industry and envirornmental and health concerns. Tobacco and petroleum stock prices are examples of this. Discount rates on their investment projects may be higher than "ethical investments". I wonder whether a business in socially unacceptable areas is sustainable and if so is necessarily reflect in the stock prices.

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #2 below.

* **10 pts - 10 points for a reasonable answer that is based on the arguments that we discussed in the lectures**
* 5 pts - 5 points for an incomplete answer or a correct answer that is too long (longer than 1 paragraph)

Question 3

What is the present value of a growing perpetuity that generates a cash flow of 35 next year and grows at a rate of 7% a year forever, if the discount rate is 5% a year? (Hint : it is not a negative number !)

Arguably the answer is infinity. The formula for the NPV of future cash flow in perpetuity is NPV = C/(r-g) where C is the cash flow, r is the discount rate and g is the growth rate. As g approaches the value of r there is an increase in the NPV. When r = g the denominator is 0 and the NPV becomes equal to infinity.   
  
A negative 2% (5% - 7%), with an NPV of $1,750, is not the equivalent to a positive 2% (5% - 3%). That would defy the logic of a 1% (5%-4%) which gives a NPV of $3,500.

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #3 below.

* **10 pts - 10 points for figuring out what is the NPV**
* 5 pts - 5 points for an incomplete answer

Question 4

Explain why the IRR rule (take projects with IRR greater than the discount rate) is equivalent to the NPV rule (take projects with positive NPV). What are the conditions that you need to check to make sure that you can compute IRR ? (1 paragraph)

The IRR (Internal Rate of Return) is the discount rate used that makes the NPV on an investment project equal to zero. That means an IRR greater than the discount rate would give a positive NPV.

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #4 below.

* **10 pts - 10 points for a reasonable answer that is based on the arguments that we discussed in the lectures**
* 5 pts - 5 points for an incomplete answer or a correct answer that is too long (longer than 1 paragraph)

Question 5

Leather Goods Inc. wants to expand its product line into wallets. The required initial outlay is $700,000. They expect to sell 150,000 units per year, and their planning horizon is 5 years. The price of wallets is estimated to be equal to $12 for the entire period, and the costs of production are $9 per unit for the entire period. However, the company expects the wallet project to erode $200,000 of the yearly sales of the existing products of the company. In addition, they estimate that competitors, who produce similar wallets, will erode $100,000 of the firm’s current sales if the wallet project does not go through. If the wallet project does go through, erosion from competitors is going to be equal to 50,000. Assume no salvage value (the project is worth zero after the end of 5 years), no taxes, no working capital and straight line depreciation. Draw a time line with the relevant cash flows for the wallet project. There is no need to compute IRR or NPV.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | New |  | Old |  |  |  |
|  | Outlay | Profit | Lost Sales from substitution | Lost Sales from Competition | Net Cash Flow | Net Cash Flow |
|  |  |  |  |  |  |  |
| Y0 | -700,000 |  |  |  | -700,000 |  |
| Y1 |  | 450,000 | - 200,000 | -50,000 | 200,000 | -100,000 |
| Y2 |  | 450,000 | -200,000 | -50,000 | 200,000 | -100,000 |
| Y3 |  | 450,000 | -200,000 | -50,000 | 200,000 | -100,000 |
| Y4 |  | 450,000 | -200,000 | -50,000 | 200,000 | -100,000 |
| Y5 |  | 450,000 | -200,000 | -50,000 | 200,000 | -100,000 |

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #5 below.

* 10 pts - 10 points for the correct cash flows
* **5 pts - 5 points for an answer that is partially correct.**

Question 6

You are considering whether to enroll in a full time MBA at an annual after-tax cost of 200,000 including tuition and all living expenses. The program lasts two years. You estimated that after the program ends, you will be able to increase your lifetime, after-tax earnings by 700,000. Is the MBA a positive NPV investment for you?

This is not a straightforward exercise. First you would remove living expenses that would not have been incurred had the MBA not been undertaken although the course may require you give up employment to be able to study.

Consideration should be given to

* the probability that the course would not be passed
* inflation over the working life
* the length of the working life - maybe 40 years
* the satisfaction of obtaining the qualification.
* the ability of raising money to fund the course and yourself

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #6 below.

* **10 pts - 10 points for for a reasonable answer that is based on the arguments that we discussed in the lectures**
* 5 pts - 5 points for an incomplete answer

Question 7

You work for a pharmaceutical company that is developing a new drug to reduce cholesterol. Based on current information, the drug’s NPV is estimated to be 200 million dollars. You are trying to decide whether it is worth undertaking additional research before launching the drug. Specifically, you want to find out whether the drug can also be sold to pregnant women. Right now the drug is not approved to be used for that group. This R&D will cost 10 million dollars, and will last for one year. If the research turns out to be positive, you can increase the drug’s NPV to 250 million (in one year). But if the research turns out negative results you have to go back to the original plan. In that case the NPV of the drug is still 200 million (next year). The probability of success is 30%, and the discount rate is 10%. Should you launch the drug today, or should you do additional research and wait until next year?

This would be considered in light of reversibility of the investment. Because the fall back position, should the application for pregnant women be unsuccessful, would be NPV of $200M the project should not wait for a year.

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #7 below.

* 20 pts - 20 points for a complete answer that is correct. To get 20 points the student should set up the decision tree correctly, and calculate the correct NPV
* 15 pts - 15 points for a good answer that has calculation mistakes. For example if the student sets up the right decision tree but makes a calculation mistake to get the NPV
* **10 pts - 10 points for an incomplete answer**

Question 8

Consider the gold mine problem we discussed in the lecture notes. Your task is to show that if the cost of closing the gold mine is zero (we called this cost the “decomissioning cost”), then it will never make sense to wait a year to get more information about gold prices. There is no need to do math, a logical argument should suffice. But you can do math if you would like to.

If there is no decommissioning cost the project should go ahead now if there is a positive NPV of $36,190 in year 1. If gold prices drop creating losses, operations could cease.  
  
In gold mining it is practice to mothball projects while gold prices are below the cost of mining/refining

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #8 below.

* **10 pts - 10 points for a reasonable answer that is based on the arguments that we discussed in the lectures**
* 5 pts - 5 points for an incomplete answer

Question 9

Explain why the option to wait is more valuable when investments are irreversible. (1 paragraph)

If a project is irreversible, i.e. once started must be carried on until completion, then waiting until the NPV of cashflow is positive is the preferred option. This allows the company to avoid losses where they are a possibility.

See the Review Criteria section of the Instructions tab for details, then allocate points for Question #9 below.

* **10 pts - 10 points for a reasonable answer that is based on the arguments that we discussed in the lectures**
* 5 pts - 5 points for an incomplete answer or a correct answer that is too long (longer than 1 paragraph)