Asset Pricing and Valuation

Lecture 6: Example Exam Questions

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Exam

Instructions

There are 25 questions in total: multiple choice or true/false, open question, numerical-input questions.

The exact points a question weights is shown at the beginning of each question.

No penalization for wrong answer.

Provide on Moodle proof of your work:

From the moment you finish your exam, you will have 5 minutes to upload a document supporting your answers (e.g., the Excel you used for exercises, or a picture if you did all the work by hand, etc). All answers need to be supported on this proof - i.e., even true/false, yes/no questions: show me why you chose your answer.

Any correctly answered question not backed by proof will not count.

Other info:

1 question per page. Be aware: once you go forward and change the page (i.e., answer a question and move on to the next one) you cannot go back!

Open notes/book

Please respect the Esade honor-code

Good luck!!

Question 1

- What is the PV of the following cash flows, the discount rate is 9%

Year 1: 100,000

Year 2: 150,000

Year 3: 200,000

Answer 1

$$(100000/1.09) + (150000/(1.09)^2) + (200000/(1.09)^3) = 3724$$

Question 2

- A 3 year bond with 8% coupon rate and 1000 USD face value.

- Investor demands a 5% semiannual return

- What is the price of the bond making semiannual coupon payments?

Answer 2

$$\text{semiannual payment} = (1000) * (0.08/2) = \$40$$

$$PV = 40/1.05 + 40/(1.05)^2 + 40/(1.05)^3 + 40/(1.05)^4 + 40/(1.05)^5 + 1040/(1.05)^6 = 9$$

- As a price of its face value

$$(949.24/1000) * 100 = 94.924$$

Question 3

- Assume the following cash flows for a project-

Year 1: -1000

Year 2: 600

Year 3: 720

Year 4: 2000

- The discount rate is 20%. Calculate the discounted payback period for the project.

Answer 3

$$1000 = 600/(1.2) + 720/(1.2)^2$$

- So the project can pay itself back after 2 years

Question 4

- Assume the following cash flows for a project-

Year 1: -200

Year 2: 150

Year 3: 120

The discount rate is 5%

- Compute the Net Present Value (NPV) of the project

Answer 4

$$NPV = -200 + 150/1.05 + 120/(1.05)^2 = 51.70$$

Question 5

- What is the difference between a long position and a short position in a futures contract?

  - A long position is a bet that prices will rise, while a short position is a bet that prices will fall.

  - A long position is an obligation to buy an asset, while a short position is an obligation to sell an asset.

  - A long position is a bet that prices will fall, while a short position is a bet that prices will rise.

  - A long position is an obligation to sell an asset, while a short position is an obligation to buy an asset.

  - A long position is a bet that prices will remain unchanged, while a short position is a bet that prices will fluctuate.

Answer 4

- A

- A long position is a bet that prices will rise, while a short position is a bet that prices will fall.

Question 6

-We have the following information about a portfolio of stocks, X, Y, Z

Stock	Investment Amount	Expected Return
X	20,000	8%
Y	5,000	12%
Z	25,000	14%

- Calculate the expected return of the portfolio

    - 11.3%

    - 11.4%

    - 11.5%

    - 11.6%

    - None of the above

Answer 6

- Three weights for each asset is $w_X = 0.4, w_Y = 0.1$ and $w_Z = 0.5$

- Expected return of the portfolio is
$$E(R_p) = 0.4(0.08) + 0.1(0.12) + 0.5(0.14) = 0.114 = 11.4\%$$

Question 7

- The market portfolio's beta is?

    - 0

    - 1

    - -1

    - 0.5

    - None of the above

Answer 7

- **B** The market portfolio's beta is 1

Question 8

- The risk-free rate is 0.06 and the expected market return is 0.12

- According to CAPM, the expected return on security X with a beta of 1.2 is?

- 0.06

- 0.0144

- 0.012

- 0.0132

- 0.018

Answer 8

$$E(R_i) = r_f + \beta(R_m - r_f)$$
$$E(r_i) = 0.06 + 1.2(0.12 - 0.06) = 0.018 E(r_i) = 13.2$$

Question 9

A security has an expected return of 0.10 and a beta of 1.1, the market return is 0.08 and the risk free rate is 0.05. What is the security's alpha?

- 1.7%
- -1.7%
- 8.3%
- 5.5%

Answer 9

- 1.7%

- 10% - [5%+1.1(8%-5%)] = 1.7%

Question 10

- Securities A and B have forecasted returns of 14% and 18% over the next 12 months. During the same period, the market (M) is expected to generate returns of 16%. If the risk-free rate is 6% and $\beta A = \beta B = 1.1$, use the CAPM to determine whether the securities are correctly valued.

- A. Both A and B are overvalued.

- B. A is overvalued and B is undervalued.

- C. B is overvalued and A is undervalued.

- D. Both A and B are undervalued.

Answer 10

- Correct answer: B

- According to the CAPM, a security with a beta of 1.1 has a required return = 6% + 1.1(16% - 6%) or 17%. Therefore, A (expected return = 14%) is overvalued and B (expected return = 18%) is undervalued.

Question 11

- Which of the following is a characteristic of a futures contract?

- It can be customized to meet the needs of the buyer and seller.

- It gives the holder the right, but not the obligation, to buy or sell an underlying asset.

- It is settled at any time before the expiration date.

- It is traded on an exchange.

- It can only be settled by delivering the underlying asset.

Answer 11

- It is traded on an exchange.

Question 12

- Which of the following is a difference between a futures contract and a forward contract?

- Futures contracts are more customizable than forward contracts.

- Futures contracts are more standardized than forward contracts.

- Futures contracts are settled daily, while forward contracts are settled at expiration.

- Futures contracts are more expensive than forward contracts.

- Futures contracts have a longer expiration date than forward contracts.

Answer 12

- Futures contracts are more standardized than forward contracts.

Question 13

- The beta of Stock A is 1.5. If the expected return of the market is 15%, and the risk-free rate is 10%, what is the expected return of Stock A?

- 32.5%

- 13.5%

- 17.5%

Answer 13

- 10 + 1.5 * 5 = 17.5%

Question 14

- Which statement(s) is/are TRUE regarding the market portfolio?

  -1) It includes all publically traded financial assets

  -2) It lies on the efficient frontier

  -3) All securities in the market portfolio are held in proportion to their market values

  -4) It is the tangency point between the capital market line and the indifference curve
-    1. only
-    2. only
-    3. only
-    4. only
-    1. and 2) only
-    1. and 3) only
-    1. and 4) only
-    2. and 3) only
-    2. and 4) only
-    3. and 4) only
- 1), 2) and 3)

Answer 14

- 1), 2) and 3)

- The tangency point between the CML and the indifference curve is the optimal portfolio for a particular investor.

Question 15

Calculate the expected nominal return and the standard deviation of the following stock.

Year	Nominal Return
1	0,11
2	-0,04
3	0,18
4	0,04
5	0,3

Answer 15

Expected nominal return formula:

$$Expected\ nominal\ return = \frac{Sum\ of\ nominal\ returns}{Years}$$

Standard deviation

$$\sigma = \sqrt{\sigma^2} = \sqrt{\sum_{t=0}^{T} \frac{(\bar{r}_t - r_t)^2}{T}}$$

Year	Nominal return	Deviation from mean	Contribution to variance
1	0,11	-0,008	6,4E-05
2	-0,04	-0,158	0,024964
3	0,18	0,062	0,003844
4	0,04	-0,078	0,006084
5	0,3	0,182	0,033124
Expected nominal return			0,118
Variance			0,013616
Standard deviation			0,116687617

Question 16

- Suppose we expect the price of XYZ company to be very volatile but we don't have a view on the direction it will move. Which of the following is the best strategy?

- Buy one share and one put

- Buy one call and sell one put

- Buy one put and one call

- Buy bonds and one call

Answer 16

- Buy one put and one call

Question 17 (Question)

- We consider an equally weighted large portfolio which we construct such that;

  - For each individual stock, the variance is 0.20

  - For each pair of stocks the covariance is 0.10

- **Statement** As we increase the number of stocks in the portfolio, the variance of the portfolio's return approaches 0.10

  - TRUE/FALSE?

Question 17 (Answer)

- TRUE

Old material

Question 11

- Which statement is **FALSE** regarding the CML (capital market line)

- The CML is the line from the risk-free rate through the market portfolio

- The CML is the best attainable capital allocation line (CAL)

- The CML is also called the SML (security market line)

- The CML always has a positive slope

- The risk measure for the CML is the Standard Deviation

Answer 11

- The CML is also called the SML (security market line)

    - The CML and the SML depict risk/return relationships

    - The risk for the CML is the standard deviation

    - The risk for the SML is β

    - The CML is the SML and the other points are also true (we asked what is not true)

Question 5

- **Order the assets below from least to most risky.**

a. T-bonds

  - b. T-bills

  - c. Large, financially-robust companies

  - d. Bitcoin

Anwser 5

- A, B, C, D

- T-bills, T-bonds, large, financially-robust companies, and Bitcoin

Question 6 (Question)

- We consider an equally weighted large portfolio which we construct such that;

    - For each individual stock, the variance is 0.20

    - For each pair of stocks the covariance is 0.10

- **Statement** As we increase the number of stocks in the portfolio, the variance of the portfolio's return approaches 0.10

    - TRUE/FALSE?

Question 6 (Answer)

- TRUE

Question 7 (Question)

- Which of the following is a factor that affects the price of an option?

    - The strike price

    - The expiration date

    - The volatility of the underlying asset

    - The interest rate

    - All of the above

Answer 7

- All of the above

Theory

- Portfolio is a collection of investments consisting of assets

- Portfolio expected return:

$$E(R_p) = \sum_{i=1}^{n} w_i E(R_i)$$

- Where w is the weight, and R is assets return

- Assume we have a portfolio of two assets and we expect a return of 8% and 6%

$$E(R_p) = 0.5 * 0.08 + 0.5 * 0.06 = 0.07 = 7\%$$

- Portfolio variance (measure of risk)

$$\text{portfolio variance} = W_A^2 \sigma^2(R_A) + W_B^2 \sigma^2(R_B) + 2W_A W_B Cov(R_A, R_B)$$

- Portfolio Standard deviation (square root of the portfolio variance)

$$S.D = \sqrt{W_A^2 \sigma^2(R_A) + W_B^2 \sigma^2(R_B) + 2W_A W_B Cov(R_A, R_B)}$$

Question 2 (Answer)

$$\text{portfolio variance} = W_A^2 \sigma^2(R_A) + W_B^2 \sigma^2(R_B) + 2W_A W_B Cov(R_A, R_B)$$

- First compute the covariance between the both stocks

$$\text{Covariance, cov(A,B)} = (0.15)(0.06 - 0.082)(0.04 - 0.04975) + 0.6(0.08 - 0.082)(0.05 - 0.04975) + 0.25(0.10 - 0.082)(0.$$
$$= 0.0000561$$

Using the weight and standard deviation for each stock

$$= 0.5^2 * 0.01249^2 + 0.5^2 * 0.0046^2 + 2 * .5 * 0.5 * 0.0000561 = 0.00007234$$

Therefore;

$$\text{portfolio standard deviation} = \sqrt{0.00007234} = 0.00851$$

Question 3 (Question)

An efficient portfolio contains only systemic risk? + TRUE/FALSE?

- Answer
  - TRUE

Question 8 (Question)

- Which of the following is a component of the time value of an option?

    - The strike price

    - Current price of the underlying asset

    - The expiration date

    - None of the above

- Answer

    - The expiration date

Question 9 (Question)

- Which of the following is a factor that affects the delta of an option?

  - The price of the underlying asset

  - The time to expiration

  - The volatility of the underlying asset

  - All of the above

- Answer

  - The price of the underlying asset

Question 5

- Company must choose between two types of projects

- Project A costs 600,000 and will last for 5 years and requires a maintenance fee each year

- Project B costs 750,000 and will last for 7 years, it requires 30,000 in maintenance each year (occuring at the end of each year)

- The discount rate is 12%

- What project should we go with?

Answer 5

$$ = 1/0.12 * (1-(1/1.12^5)) = 3.60 \ = (1/.12) *(1 - (1/(1.12^7))) \

$$

PV (A) = 600,000 + 60,000 (3.6048) = 816,286

EAC = 816,286/(3.6048) = 226,444

PV(B) = 750,000 + 30,000 (4.5638) = 886,913

EAC = 886,913/(4.5638) = 194,336.45

- Accept the project with least annual cost.

Question 14

- Which staement considering a market portfolio is **FALSE**

- It includes all publically traded financial assets

- It lies on the efficient frontier

- All securities in the market portfolio are held in proportion to their market values

- It is the tangency point between the capital market line and the indifference curve

- All of the option are TRUE

Answer 14

- It is the tangency point between the capital market line and the indifference curve

- The tangency point between the CML and the indifference curve is the optimal portfolio for a particular investor.

Question 15 (Question)

- We consider an equally weighted large portfolio which we construct such that;

  - For each individual stock, the variance is 0.20

  - for each pair of stocks the covariance is 0.10

- As we increase the number of stocks in the portfolio, the variance of the portfolio's return approaches 0.10

  - TRUE/FALSE?

Answer 15

- Answer
  - TRUE

- Why?
  - Portfolio is equally weighted, so increasing the number of stocks in the portfolio to say 1000, each stock has a weight of 0.1% (1/1000)
  - The variance of the portfolio is calculated using variances and covariances of the individual assets

- The formula for the variance of the portfolio is:

$$\sigma^2(R_p) = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j Cov(R_i, R_j)$$

- Where w_i and w_j are the weights of i and j - $Cov(R_i, R_j)$ is the covariance between the returns of i and j

- As we increase the number of stocks, the first term in the variance formula $\boxed{\text{\textbackslash sigma\_\textasciicircum2}}$ (depends on the individual variances of the stocks)
- So the weights w_i become smaller - squaring a small number becomes very small
  - $4^2 = 16$
  - $0.5^2 = 0.25$
  - $0.00001^2 = 0.0000000001$
- The second term - covariances becomes dominant, all pairs of stocks have a covariance of 0.10
  - As the number of stocks increase this term approximates 0.10
- In large portfolios, the impact of stock variance (0.20) diminishes - overall portfolio variance converges to the average covariance of the stock pairs (0.10)
- To conclude:
  - As the portfolio increases in size, the variance of the portfolio approaches the average covariance between the stocks (0.1)
  - Diversification, where unsystemic risk (specific to each stock) is diversified away in large portfolio
  - We are left with systemic risk - represented by the covariance among stocks