

Finance I (FIN-I)

Seminar Assignments

HT-2022



Stockholm Business School
Stockholm University

Instructions for the seminar assessment task

You should form a working group of 1-10 students to work with these assignments. If you need help finding people to work with, please use the Athena FAQ forum “Seminar group member search”. All students in the working group needs to be in the same seminar group, so please make sure that you register for the same seminar group.

Each group needs to submit once for each seminar, please make sure that you submit both your answers and your solutions and keep the deadlines. The deadlines to submit assignments associated with each seminar are:

- Seminar 1: Tuesday, December 13 at 22:00
- Seminar 2: Tuesday, January 10 at 09:30

Please note that there are answer sheets provided for each seminar that you find on the course page. You should write your answers in the first Excel sheet. Note that we require you to solve the exercises using Excel. Note that in the answer sheet file there are already sheets prepared for each question so we suggest you to perform all your calculations for question 1 in the sheet named “Question 1”. If you need help to get started with making calculations in Excel, please view Ian’s Excel videos:

<https://www.youtube.com/watch?v=uBLO-gaPU7s&list=PLf2Z3I1bgUICoyEMpYScIoa5EIUi0gd0>

When presenting in Excel it is a good idea to attempt to format your calculations. If you need help getting started with that, please watch the following playlist:

https://www.youtube.com/watch?v=1NkSt9WTZIE&list=PLf2Z3I1bgU1AGURy6dBhqOzBzlA_Okay5

Assignment set 1

Please note that in question 1.9, the date written here might not correspond to the link. It directs you to the most recent bond auction and it is possible that Sweden have issued a more recent bond than the one referred to here. Please use the information in the link and make sure to state the information you have used in your solutions.

1.1 Present value calculation

You are going to receive a total of five payments, one per year. The first cash flow amounts to 100 SEK and will be received in one year's time. The subsequent cash flows will then increase by 10 % annually.

Use an annual discount rate of 8 % in your calculations.

1.2 Internal Rate of Return (IRR)

What is the IRR of an investment with the following numbers:

Initial Outlay	15 MSEK
Net Cash Flows year 1-10	3 MSEK
Salvage Value	2 MSEK

Give us the IRR with one decimal

(It is not possible for you to find an exact IRR, but you should be certain that it is rounded to 12.1 % and not to 12.2 % or 12.0 %)

1.3 Compare two investments

Which of the following two investments is preferred if they can be repeated many times in the future?

	Investment A	Investment B
Initial Outlay	100 MSEK	150 MSEK
Annual Net Cash Flows	20 MSEK	21 MSEK
Salvage Value	60 MSEK	100 MSEK
Lifespan of Project	5 years	10 years
Discount Rate	10 %	10 %

1.4 Comparing several investments

You just won the highest prize in a lottery and are given the opportunity to choose how you want your prize to be paid to you. The different alternatives are given in the table below.

Alternative Payment plan

- A 750,000 SEK today
- B 8,650 SEK per month for 20 years. The first payment is received in one month's time.

- C 54,000 SEK every 6 months, with the first payment being paid immediately (31 payments in total).
- D One payment of 130,000 SEK today, and then 130,000 SEK annually for 10 years (a total of 11 payments).
- E 22,000,000 SEK received in 30 years.

Use an annual discount rate of 12 % in your calculations.

Which of the alternatives should you choose, and what is the present value of that alternative?

1.5 Annual savings

You plan to travel around the world 10 years' from now. You estimate that you will need 59,000 SEK and decide to start saving today. You will make your first deposit today and plan to make a total of 10 deposits into your savings account (including the one today).

If every deposit you make is an equally large sum, how big does that sum have to be in order for you to have 59,000 SEK 10 years from now?

Assume that the interest rate paid by the bank is 4.3 % and that you have to pay 30 % in taxes on interest gains.

1.6 Present value with real cash flows

You wish to purchase a car 4 years from now. The price of the car today is 500,000 SEK and you believe that the price will increase by the annual inflation.

Assume that the annual inflation is 2 % and that the bank offers you an annual interest rate of 1 %, how much money do you need to put in your account today in order to be able to purchase the car in 4 years' time?

1.7 Free Cash Flow valuation

a) You have been given the following numbers from the management of a company as an estimation of future performance (numbers in MSEK):

Year	0	1	2	3
EBIT		180	200	230
Depreciation		20	24	27
Working Capital	100	120	125	130
Investments		50	55	60

The free cash flow (FCF) in year 4 is estimated to be 150 MSEK and is expected to grow by 4 % until the end of time. The WACC of the company is 13 % and the company tax paid is 25 %.
What is the enterprise value of the firm?

b) Suppose the company has 100 million shares outstanding and 400 MSEK in debt, what is its share price?

1.8 Bonds

You are considering purchasing the following bond:

Face Value: 1,000,000 SEK
Coupon rate: 5.0 % (coupons are paid once per year)
Time to maturity¹: 30 years

The yield to maturity of the bond is 6 %.

- a) What is the price of the bond today?
- b) For the same bond in item a, assume that we wish to sell it in 10 years' time after the coupon has just been paid and that the yield to maturity has dropped to 5 % by then. What price do we receive when we sell the bond?²
- c) Use the table in the answer sheet and indicate the cash flows received from an investment consisting in buying the bond 30 years before its maturity, keeping it for 10 years and selling it right after coupon number 10 is paid (the investment in year 0, the coupon payments and the payment received when we sold the bond at the price computed in item b). Use the values actually paid out those years, not the present value. Also, indicate by using the sign + or – if it was a cash outflow or a cash inflow).

¹ Also called the "term" of the bond

² A tip here, the bond had 30 years until it matured when we purchased it. Now we have been holding onto it for 10 years, what is now the time to maturity of the bond?

1.9 Valuation of a Swedish Government Bond

Now that you have learned how to value a bond we will use this in a practical example where we use data on a Swedish Government Bond. You find the data in this link:

<https://www.riksdagen.se/en/our-operations/central-government-borrowing/issuance/latest-auction-result/nominal-government-bonds>

The question you have to answer is what investors had to pay for this bond when it was sold?³ **(read the footnote)**

Assignment set 2

In order to do the seminar assignments 2.2 and 2.3 you might wish to watch the videos on statistics in the playlist

<https://www.youtube.com/watch?v=qnpghvXTyEg&list=PLf2Z3l1bgUIC2LFSEluHLnpQCZirLu1tl>

In order to do the seminar assignments 2.8 and 2.9 you will need to watch the two first videos on options in the playlist

<https://www.youtube.com/watch?v=sKUCOkEjKio&list=PLf2Z3l1bgUIDpgeBB-n3bB7t7t1t6PSxB>

Note that your lecture on options is later than the submission deadline, so please watch these videos early enough to give you time to solve these questions.

2.1. The Constant Dividend Growth Model

The following is known of the company AB Finance:

- The current price per share is 86.4 SEK, which corresponds to the value given by the Constant Dividend Growth Model
- Yesterday the company paid a dividend of 4 SEK per share
- The dividend is expected to have a constant growth of 8 % per year
- The risk-free rate is 4 %, and the market risk premium is 5.5 %.

³ All numbers are in MSEK. If you see more than one bond, take one of them, for example the top one, and make sure to state all your values in your solutions so we know what you worked with.

“Offered/tendered” = The face value of the bond

The “Auction date” is the date the bond was sold. Round the time to maturity to a whole number of years.

“Coupon %” = coupon rate

“Yield avg” = the yield to maturity of the bond that you should use. It is already given as a percentage, so 0.93535 means 0.93535 %.

Coupons are paid once per year, and we assume that the first one is paid one year from the day the bond is sold.

The management is considering a reduction in the dividend next year in order to enable the company to invest more and enhance growth of the company. The dividend next year will then according to their plan be 3 SEK/share, but the growth in dividends is increased to 10 % annually. What will be the new share price, assuming that we still have the same equity cost of capital?

2.2 Standard Deviation and Correlation

Between 1999 and 2002, the shares of SKF and Volvo had the following return per year:

	SKF	Volvo
1999	-12 %	-15 %
2000	-5 %	11%
2001	23 %	34%
2002	2 %	-6 %

Use this information to estimate:

- The standard deviation of the SKF share.
- The correlation coefficient between the SKF and Volvo shares.

2.3 Expected Value, Standard Deviation and Correlation using probabilities

You have been considering investing in the stocks Fishing AB (a company fishing salmon in the Baltic sea) and CleanSeas AB (a company cleaning up polluted waters). An ecologist has just told you about new research^[1] showing that the mercury levels of fish in Swedish waters exceeded the FAO/WHO limit of 0.5-1.0 mg kg⁻¹ mercury levels in fish for human consumption in 52.5% of the cases. As a consequence the European Union will do further testing in the Baltic Seas. If they find higher than normal mercury levels this will have a dramatic impact on the demand of salmon from the Baltic seas. However, CleanSeas AB might be hired for addressing the issue.

Compute the following:

- The expected returns of Fishing AB and CleanSeas AB
- The standard deviation of their returns
- The covariance between both returns
- The correlation coefficient between both returns

Outcome	Probability	Fishing AB	CleanSeas AB
High Mercury Levels	5%	-30%	20%

Normal Mercury Levels	95%	10%	-10%
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[1] Åkerblom, S., Bignert, A., Meili, M. et al. AMBIO (2014) 43(Suppl 1): 91.
doi:10.1007/s13280-014-0564-1

2.4 Portfolio theory

Calculate the standard deviation of Pelle's portfolio, where he has invested 50 % of his money in Axfood and 50 % in Telia Sonera.

Assume that the correlation coefficient between the two shares is 0.34 and that the standard deviation of Axfood is 24.24 % while the standard deviation of Telia Sonera is 37.62 %.

2.5 A portfolio with one risk-free asset and one risky asset

- a) Create a portfolio consisting of one risk-free asset and one risky asset where you wish to have a standard deviation of the portfolio of 25 %. The standard deviation of the risky asset is 30 %.

How much should be invested in the risk-free asset and how much should be invested in the risky asset?

- b) Create a portfolio consisting of two stocks, A and B, with the goal of having as low risk as possible (risk is measured as the standard deviation of the portfolio). The standard deviation of A is 25 % while it is 30 % for B. The correlation coefficient between the two stocks is 0.6

How much should be invested in A and how much should be invested in B?

2.6 Combining different formulas

Find the standard deviation of the market portfolio using the following information:

- The stock C has a beta of 1.3
- The standard deviation of C is 27 %
- The correlation coefficient between C and the market portfolio is 0.78

2.7 Comparing stocks

You have the opportunity to invest in either stock A or stock B, and we know the following:

Stock A has a standard deviation of 0.40, and the correlation between A and the market portfolio is 0.4

Stock B has a standard deviation of 0.3, and the correlation between B and the market portfolio is 0.8

The market portfolio has a *variance* of 0.04.

- a) Which stock has the highest beta?
- b) Which stock has the highest expected return? Motivate your answer using a maximum of 100 words.

2.8 Options

In both a) and b), use the different stock prices given in the answer sheet.

You have purchased a call option and a put option on the same underlying stock. The strike price of the call option is 110 SEK and the strike price of the put option is 90 SEK.

- a) Compute the payoff of the portfolio for different values of the stock price on the expiration date. Use the stock prices given in the answer sheet.
- b) Now assume that we paid a total premium of 20 SEK to obtain this portfolio. What is then our total profit given the different stock prices on the expiration date?

2.9 Options

You have purchased one call and one put option on the same underlying stock. The strike price of the call option is 195 SEK and the strike price of the put option is 205 SEK.

- a) What is the minimum payoff of your portfolio on the expiration date?
- b) Which prices of the underlying stock on the expiration date yield this minimum payoff?
- c) What is the minimum total amount we must have paid in premiums for this portfolio?
(A tip here is to remember that there must be someone selling these options to us. Also note that we do not have enough information to actually compute the option price, nor have you learned yet how to actually do it.)