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Technische Universiteit Delft

Exam Principles of Asset Trading (WI3418TU)
25 January 2017, 18.30 – 21.30

The exam will consist of two, equally weighted, parts. The first part contains 20 multiple choice questions and the second part 3 open questions. There is a formula page available.

You **are** allowed to use a (graphical) calculator, you **are not allowed** to use the book, **neither** to use prepared notes.

Part 1 – Multiple Choice

Question 1.

For investment decision purposes, we model projects in terms of cash flows and cash flow streams. Which of the following answers is true:

A) Cash flow streams are a series of cash flows, where cash flows can be positive (receiving cash) and negative (paying cash).
B) Cash flows are a series of cash flow streams, where cash flow streams can be positive (receiving cash) and negative (paying cash).
C) Cash flow streams are a series of cash flows, where cash flows are always negative (paying cash).
D) Cash flows are a series of cash flow streams, where cash flow streams are always negative (paying cash).
E) Cash flow streams are a series of cash flows, where cash flows are always positive (receiving cash).
F) Cash flows are a series of cash flow streams, where cash flow streams are always positive (receiving cash).
G) Cash flows are positive (receiving cash) and cash flow streams are negative (paying cash).
H) Cash flow streams are positive (receiving cash) and cash flows are negative (paying cash).

Question 2.

Suppose you have a project where you invest EUR 5.000 in the first year and EUR 3.000 in the second year. During 10 years thereafter you receive EUR 1.000 per year and at the end you have to pay EUR 3.000 dismantling cost and the project stops. Which of the following statements is true:

A) The NPV of this project depends on the discount rate. For high discount rates, like 50% and higher the NPV is certainly positive, so in that case you should not invest.
B) The NPV of this project depends on the discount rate. For high discount rates, like 50% and higher the NPV is certainly negative, so in that case you should not invest.
C) The NPV of this project is always negative, you should never invest.
D) The NPV of this project is always positive, you have to invest.
E) None of the above is true.

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Question 3.

Regarding the calculation of the Net Present Value, the following statement holds:

A) You have to apply the discount rate to the cash flows, which is also called *weighted average cost of capital and* is equal to the *expected return of an investment with a similar risk profile.*
B) You have to apply the discount rate to the cash flows, which is also called *opportunity cost of capital and* is equal to the *expected return of an investment with a similar risk profile.*
C) You have to apply the discount rate to the cash flows, which is also called *opportunity cost of capital and* is equal to the *interest rate the company has to pay on its loans.*
D) You have to apply the discount rate to the cash flows, which is also called *weighted average cost of capital and* is equal to the *interest rate the company has to pay on its loans.*
E) You have to apply the discount rate to the cash flows, which is also called *opportunity cost of capital and* is equal to the *dividend yield the company has to pay to its shareholders.*
F) You have to apply the discount rate to the cash flows, which is also called *weighted average cost of capital and* is equal to the *dividend yield the company has to pay to its shareholders.*

Question 4.

In valuation problems the concepts of both Net Present Value (NPV) and Internal Rate of Return (IRR) are used. Which of the following is true?

A) The IRR is the discount rate you have to apply to the NPV calculation such that the NPV is zero. If IRR exceeds the opportunity cost of capital, it is a good investment opportunity. The IRR is independent of the risk of the project.
B) The IRR is the discount rate you have to apply to the NPV calculation such that the NPV is zero. If IRR is below the opportunity cost of capital, it is a good investment opportunity. The IRR is independent of the risk of the project.
C) The IRR is the Net Present Value as a percentage of your initial investment. If IRR exceeds the opportunity cost of capital, it is a good investment opportunity. The IRR is independent of the risk of the project.
D) The IRR is the Net Present Value as a percentage of your initial investment. If IRR is below the opportunity cost of capital, it is a good investment opportunity. The IRR is independent of the risk of the project.
E) The IRR is the discount rate you have to apply to the NPV calculation such that the NPV is zero. If IRR exceeds the opportunity cost of capital, it is a good investment opportunity. The IRR depends on the risk of the project.
F) The IRR is the discount rate you have to apply to the NPV calculation such that the NPV is zero. If IRR is below the opportunity cost of capital, it is a good investment opportunity. The IRR depends on the risk of the project.
G) The IRR is the Net Present Value as a percentage of your initial investment. If IRR exceeds the opportunity cost of capital, it is a good investment opportunity. The IRR depends on the risk of the project.
H) The IRR is the Net Present Value as a percentage of your initial investment. If IRR is below the opportunity cost of capital, it is a good investment opportunity. The IRR depends on the risk of the project.

Question 5.

Saving banks A and B both have in their advertorial that you can save money with them for 0.5000% nominal interest rate per year. Bank A pays the interest every quarter, bank B every year. Which of the following statements is true?

A) The effective rates of banks A and B are equal to 0.5000%.
B) Bank A is much better than bank B, because bank A pays 2% annually and bank B only 0.5%.
C) Bank A pays a little more, effectively 0.5009% vs 0.5000% of bank B.
D) Bank B pays a little more, effectively 0.5009% vs 0.5000% of bank A.
E) None of the above.

Question 6.

Suppose the real interest rate is 1.2% and there is 0.5% inflation. What is the nominal interest rate?

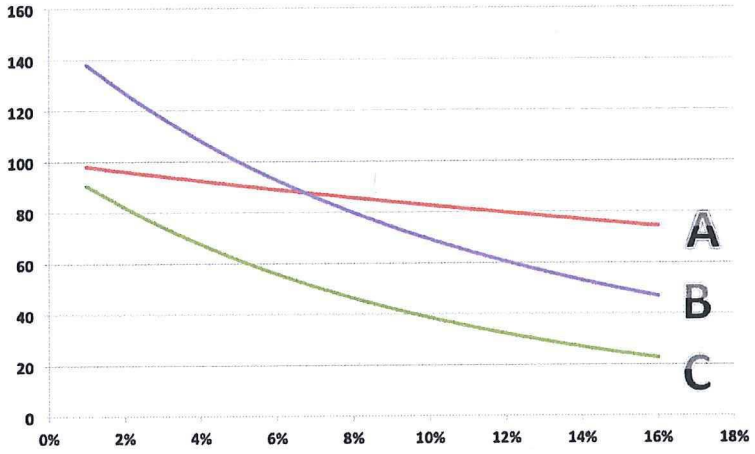
A) -0.7%
B) -0.0286%
C) 0.7%
D) 1.2%
E) 1.70%
F) 1.71%

Question 7.

Assume that the 2 year spot rate is 2% and the forward rate between year 2 and 5 equals 3%. Then the 5 year spot rate equals:

A) 2.5%
B) 2.6%
C) 3.0%
D) 3.7%
E) 4.0%
F) 13.7%

Question 8.
Below you find the yield curves of bonds A, B and C.



Which of the statements is true?

A) Bond B has a coupon of 5%, coupon of bond A is lower than of bond B, but the time to maturity is higher.
B) Bond B has a coupon of 5%, coupon of bond A is higher than of bond B, but the time to maturity is lower.
C) Bond B has a coupon of 5%, both coupon and time to maturity of bond A are lower than of bond B.
D) Bond B has a coupon of 5%, both coupon and time to maturity of bond A are higher.
E) Bond B has a coupon of 7%, coupon of A is the same, but coupon of C is much lower.
F) Bond B has a coupon of 7%, time to maturity of A is the same, but time to maturity of C is much lower.
G) Bond B has a coupon of 7%, time to maturity of C is the same, but time to maturity of A is much lower.
H) None of the above.

Question 9.
Regarding the concept of duration of a bond, the following is true:

A) The higher the coupon of a bond, the **shorter** its duration. The higher the duration the **more** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **decrease** of the bond price.

B) The higher the coupon of a bond, the **shorter** its duration. The higher the duration the **more** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **increase** of the bond price.

C) The higher the coupon of a bond, the **longer** its duration. The higher the duration the **more** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **decrease** of the bond price.

D) The higher the coupon of a bond, the **longer** its duration. The higher the duration the **more** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **increase** of the bond price.

E) The higher the coupon of a bond, the **shorter** its duration. The higher the duration the **less** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **decrease** of the bond price.

F) The higher the coupon of a bond, the **shorter** its duration. The higher the duration the **less** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **increase** of the bond price.

G) The higher the coupon of a bond, the **longer** its duration. The higher the duration the **less** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **decrease** of the bond price.

H) The higher the coupon of a bond, the **longer** its duration. The higher the duration the **less** sensitive the bond price is to changes in the interest rate. An increase in interest results in a **increase** of the bond price.

Question 10-12.

A company has a dividend of EUR 4,50 per share and earnings of EUR 6,= per share. The cost of equity capital is 9%, the weighed average cost of capital is 6.5% and the Return on Equity (RoE) equals 21%.

Question 10.
What is the growth rate of the company?

A) 2.5%
B) 5.25%
C) 6.5%
D) 9%
E) 25%
F) 75%

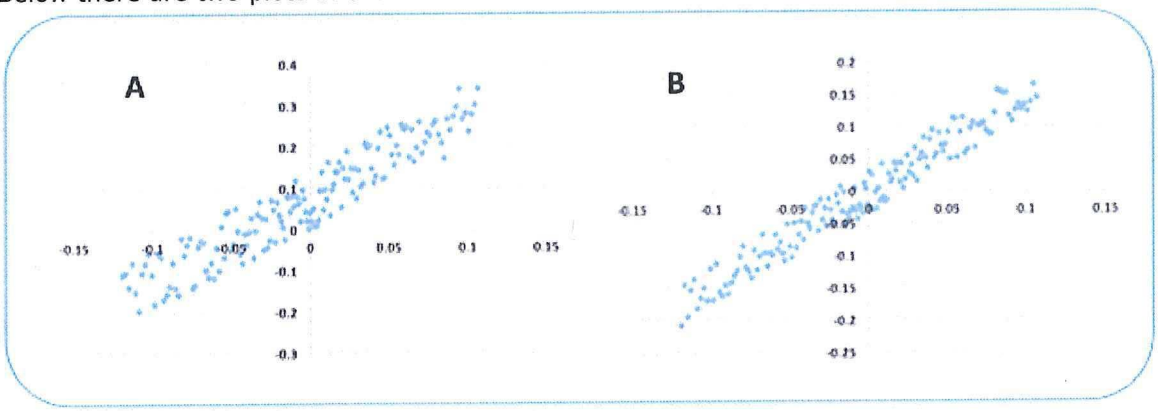
Question 11.
What is the value per share?

A) EUR 50,=
B) EUR 69,23
C) EUR 120,=
D) EUR 160,=
E) EUR 180,=
F) EUR 360,=

Question 12.
What happens to the share price (and why) if the RoE is higher than the estimated 21%?

A) The share price will rise, because a higher RoE leads to a higher plowback ratio.
B) The share price will decrease, because a higher RoE leads to a higher plowback ratio.
C) The share price will rise, because a higher RoE leads to a lower plowback ratio.
D) The share price will decrease, because a higher RoE leads to a lower plowback ratio.
E) The share price will rise, because a higher RoE leads to a higher growth rate.
F) The share price will decrease, because a higher RoE leads to a higher growth rate.
G) The share price will rise, because a higher RoE leads to a lower growth rate.
H) The share price will decrease, because a higher RoE leads to a lower growth rate.

Question 13.
Below there are two plots of the returns of shares A and B vs the returns of an index.



The following statement is true:

A) Stock A and B have approximately the same correlation with the index, but the beta of stock A is 2.5 and therefore higher than the beta of 1.5 of stock B. The volatility of both stocks is the same.

B) Stock A has a higher correlation with the index than stock B, and the beta of stock A is 2.5 and therefore higher than the beta of 1.5 of stock B. The volatility of both stocks is the same.

C) Stock A and B have approximately the same correlation with the index, but the beta of stock A is higher than the beta of stock B, whereas calculating the actual numbers is not possible. The volatility of both stocks is the same.

D) Stock A has a higher correlation with the index than stock B, and the beta of stock A is higher than the beta of stock B, whereas calculating the actual numbers is not possible. The volatility of both stocks is the same.

E) Stock A and B have approximately the same correlation with the index, but the beta of stock A is 2.5 and therefore higher than the beta of 1.5 of stock B. The volatility of A is higher than of B.

F) Stock A has a higher correlation with the index than stock B, and the beta of stock A is 2.5 and therefore higher than the beta of 1.5 of stock B. The volatility of A is higher than of B.

G) Stock A and B have approximately the same correlation with the index, but the beta of stock A is higher than the beta of stock B, whereas calculating the actual numbers is not possible. The volatility of A is higher than of B.

H) Stock A has a higher correlation with the index than stock B, and the beta of stock A is higher than the beta of stock B, whereas calculating the actual numbers is not possible. The volatility of A is higher than of B.

Question 14.
Regarding CAPM and Markowitz theory the following statement holds:

A) Markowitz is not suited for options, where CAPM clearly is.

B) Markowitz directly follows from the CAPM model as long we assume that everybody is a rational investor.

C) In CAPM correlation determines beta and that drives returns. In Markowitz, correlation plays no role at all.

D) CAPM is defined in the risk neutral world, Markowitz is with its market price of risk clearly not.

E) Markowitz is defined in the risk neutral world, CAPM is with its market price of risk clearly not.

F) None of the above.

Question 15.
Assume that for an issue of EUR 200 million in government bonds, we have the following bids of investors:

- X : 75 million for EUR 101.30
- Y : 150 million for EUR 101.10
- Z : 200 million for EUR 100.70

What happens to the issue price in case of a uniform price auction (UPA) or a discriminatory price auction (DPA)?

A) In case of **DPA** X pays 101.30 and gets his 75 million. Y pays 101.10 and gets only 125 million. Z gets nothing. In case of UPA X and Y get the same, but they both pay **101.30**.
B) In case of **UPA** X pays 101.30 and gets his 75 million. Y pays 101.10 and gets only 125 million. Z gets nothing. In case of DPA X and Y get the same, but they both pay **101.30**.
C) In case of **DPA** X pays 101.30 and gets his 75 million. Y pays 101.10 and gets only 125 million. Z gets nothing. In case of UPA X and Y get the same, but they both pay **101.10**.
D) In case of **UPA** X pays 101.30 and gets his 75 million. Y pays 101.10 and gets only 125 million. Z gets nothing. In case of DPA X and Y get the same, but they both pay **101.10**.
E) In case of **DPA** X pays 101.30 and gets his 75 million. Y pays 101.10 and gets only 125 million. Z gets nothing. In case of UPA X and Y get the same, but they both pay **100.70**.
F) In case of **UPA** X pays 101.30 and gets his 75 million. Y pays 101.10 and gets only 125 million. Z gets nothing. In case of DPA X and Y get the same, but they both pay **100.70**.

Question 16.
With respect to the IPO procedure, the following statement holds:

A) The underwriter is important, because he has to write a prospectus, needs to have an extensive client network to do the bookbuilding and he also should issue a green shoe option, otherwise the market price might fall the first day.
B) The underwriter is important, because he has to write a prospectus, needs to have an extensive client network to do the bookbuilding. His financial power is important in case of guaranteed issues. He might also use the green shoe option issued by the company to stabilize the markets in the first days.
C) The underwriter is important, because he has to write a prospectus, needs to have an extensive client network to do the bookbuilding. His financial power is important in case of guaranteed issues. The green shoe option is part of the profit of the underwriter, where the disadvantage is that it will destabilize the share price.
D) The regulator writes the prospectus and the underwriter needs to have an extensive client network to do the bookbuilding and he also should issue a green shoe option, otherwise the market price might fall the first day.
E) The regulator writes the prospectus and the underwriter needs to have an extensive client network to do the bookbuilding. His financial power is important in case of guaranteed issues. He might also use the green shoe option issued by the company to stabilize the markets in the first days.
F) The regulator writes the prospectus and the underwriter needs to have an extensive client network to do the bookbuilding. His financial power is important in case of guaranteed issues. The green shoe option is part of the profit of the underwriter, where the disadvantage is that it will destabilize the share price.

Question 17.
Regarding the propositions of Modigliani and Miller the following holds:

A) In case a company takes out more debt, the value of the company increases as the return for the share holders increase.
B) In case a company takes out more debt against the fair interest rate, the value of the company increases as the return for the share holders increase.
C) The value of the company does not increase by taking out more debt, because the extra return for the share holders come with extra risk, which stabilizes the value. Proposition 1 states no increase in value by changing the capital structure, Proposition 2 states that increase in debt results in increase in expected return.
D) The value of the company does not increase by taking out more debt, because the extra return for the share holders come with extra risk, which stabilizes the value. Proposition 2 states no increase in value by changing the capital structure, Proposition 1 states that increase in debt results in increase in expected return.
E) By taking out more debt, the value of a company decreases because of the cost of financial distress.
F) By taking out more debt, the value of a company increases as a result of the tax shield. This formula of the tax shield is one of the propositions of Modigliani and Miller.

Question 18.
Being a bond holder or a share holder in a limited company can be seen as a derivative position. Which of the following describes this position best?

A) The **bond** holder has a put **long** on the assets of the firm and the **share** holder has a call **short** on the assets of the firm.
B) The **bond** holder has a put **short** on the assets of the firm and the **share** holder has a call **short** on the assets of the firm.
C) The **share** holder has a put **long** on the assets of the firm and the **bond** holder has a call **long** on the assets of the firm.
D) The **share** holder has a put **short** on the assets of the firm and the **bond** holder has a call **long** on the assets of the firm.
E) The **share** holder has a put **long** on the assets of the firm and the **bond** holder has a call **short** on the assets of the firm.
F) The **share** holder has a put **short** on the assets of the firm and the **bond** holder has a call **short** on the assets of the firm.
G) The **bond** holder has a put **long** on the assets of the firm and the **share** holder has a call **long** on the assets of the firm.
H) The **bond** holder has a put **short** on the assets of the firm and the **share** holder has a call **long** on the assets of the firm.

Question 19.
Which of the following disadvantageous situations in a company with poor financial conditions:

1. Employees leaving the company for a job at a more stable competitor
2. Clients not buying the product, because it is old-fashioned
3. Clients not buying the product, because the economy is soaring
4. Suppliers who do not want to deliver goods without prepayment
5. Banks that do not want to enter into a bridge financing

are costs of financial distress:

A) All of them
B) 1, 2, 3, 4
C) 2, 3, 4, 5
D) 1, 2, 3
E) 2, 3, 4
F) 3, 4, 5
G) 1, 3, 5
H) 1, 4, 5

Question 20.
We have the following reasons for a merger:

1. Increase profit of the new company
2. Advantages of efficiency in marketing
3. Using complementary resources
4. Optimization because of control of the entire value chain
5. Diversification of the company risk

Which reasons are good reasons?

A) All of them
B) 1, 2, 3, 4
C) 2, 3, 4, 5
D) 1, 2, 3
E) 2, 3, 4
F) 3, 4, 5
G) 1, 3, 5
H) 1, 4, 5

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Part 2 – Open Questions

In this part all your answers need to be motivated, either by calculations or by arguments.

Question 1

Consider these two corporate bonds:

- Bond X has a time to maturity of 5 years and an annual coupon of 2.5%
- Bond Y has a time to maturity of 3 years and an annual coupon of 4.5%

Assume the yield is 4.5% for both bonds.

A) Compute the prices of X and Y.
B) Explain the concept of duration and which bond has the highest duration.
C) Compute the duration of Y.
D) Recalculate the exact price of Y in case the yield decreases with 0.5% to 4% and calculate the price change.
E) Show that you could have used the duration calculated in C to estimate the price change of Y.
F) Explain what happens to the yield in case the corporation that issued bond X becomes at some point is perceived as more risky than before.

Question 2

Two stocks A and B have the following properties:

A : Beta of 0.9, standard deviation 15%
B : Beta of 1.5, standard deviation 25%

Now assume the risk-free rate is 1.5% and the market has a return of 8% and volatility of 15%.

A) Compute the expected returns of Stocks A and B.
B) Compute the correlation with the market of Stocks A and B.

Now we assume that A and B have a correlation of 0.75.

C) Compute the weights of a portfolio that we can construct with A and B only having the lowest variance.
D) Draw a MSD diagram, where you point out the minimal variance point, the minimal variance set and the efficient frontier for portfolios of stocks A and B only.
E) Add the efficient frontier to the MSD in case the risk-free asset is also available for investing.

Question 3

Assume the market value of assets of a company is EUR 100.000. The company also has a loan of market value of EUR 30.000. The opportunity cost of capital are 8%.

A) Give the balance sheet of this company based on market value, showing assets, equity and debt.

The company extends it business and needs cash. The existing share holders sell 40% of the company to another shareholder for EUR 250.000 by issuing new shares.

B) Compute the after the money value of the company.
C) Give the balance sheet in the new situation, directly after the deposit of money.
D) Assume that the company pays 6% interest on both loans and the corporate tax rate is 25%. Compute the value of the tax shield.
E) Give the assumption that is underlying the tax shield calculation in the previous question.

Formula Page

The present value *P* of an infinite annuity that pays amount *A* every period, starting at the end of the first period is given by:

$$P = \frac{A}{r}$$

An annuity that starts paying at the end of the first period an amount *A* and pays that in total for n periods has a present value *P* given by:

$$P = \frac{A}{r}\left[1 - \frac{1}{(1+r)^n}\right]$$

Conversely we can write for the amount *A*:

$$A = \frac{r(1+r)^n P}{(1+r)^n - 1}$$