

Время выполнения - 180 минут, язык ответов – русский.
Максимальное количество баллов – 100.

ОБЩАЯ ЧАСТЬ. Макро и Микроэкономика. Задачи на 50 баллов

Problem 1 (25 points)

The investor has a wealth of 16 MU (monetary units). He is considering participation in a business project. The project with probability 1/4 will result in gain of 48 MU, and in case of failure the investor will lose 12 MU.

Question 1-1(5 points). Suppose that the investor is risk averse. What can be said about his decision to participate in the project or not to?

Question 1-2(10 points). In Questions 1-2 and 1-3 suppose that the preferences of the investor are representable by a utility function with the expected utility form (the von Neumann-Morgenstern expected utility function), and that a Bernoulli utility function is $u(x) = \sqrt{x}$.

How does this additional information change your answer in question 1-1? Illustrate the choice of the investor in the wealth-utility space (mark on the figure the expected payoff, the value of expected utility in case of participation in the project, the certainty equivalent of the project). Illustrate the choice of the investor in the contingent goods space (mark on the figure the points from which the investor chooses, the typical indifference curves, the slope of the tangent to the indifference curve on the certainty line).

Question 1-3(10 points). Suppose the investor can consult a consulting company, which is able to tell him project successfulness with guaranty. However, for the services of a consulting company he needs to pay 7 MU. Will the investor apply to the consulting company? Illustrate the choice of the individual in the contingent goods space (the figure should be clear to understand from what the investor chooses and what his decision is). Show in the figure the maximum consulting company fee that the investor agrees to pay (it is unnecessary to look for it).

Problem 2 (25 points)

Consider the closed economy in the short run with rigid prices and nominal wages. Price level is equal to 1. The Keynesian consumption function is given by the following expression: $C = 40 + 0.8Y_d$, where Y_d is disposable income. Income tax rate is equal to 25%. Government spending is exogenous and equal to 40, transfers are absent. Investment function is the following: $I = 140 - 10i$, where i is the nominal interest rate in the economy measured in percentages. Nominal money supply is exogenous and equal to 100. Keynesian money demand function is given by: $m^d = 0.2Y - 5i$.

Question 2-1(5 points). Find the equilibrium levels of Y , i and the government budget balance.

Олимпиада студентов и выпускников «Высшая лига» – 2020 г.

Question 2-2(8 points). Assume that the central bank targets nominal interest rate at the equilibrium level found in (1), while due to the exogenous shock autonomous investment increases by 60. Find the corresponding change in the nominal money supply and the new equilibrium level of income. Illustrate these changes on the IS-LM diagram and explain intuitively.

Question 2-3(8 points). Central bank does not target nominal interest rate, while due to the exogenous shock autonomous investment increases by 60. Find the corresponding change in the income tax rate, if the government wants to keep the equilibrium level of income found in (2-1) unchanged. Illustrate these changes on the IS-LM diagram and explain intuitively. What will happen to the nominal interest rate in equilibrium?

Question 2-4(4 points). Assume that as in (2-2) central bank targets nominal interest rate and increases nominal money supply to offset the influence of the investment shock. But the government wants to keep the equilibrium level of income found in (2-1) unchanged. How should government spending be changed? What will happen to the nominal interest rate in equilibrium?

II. СПЕЦИАЛЬНАЯ ЧАСТЬ. БЛОК 2. 50 баллов по блоку 2

ТЕСТЫ (всего 20 баллов по блоку 2)

1.(2 points; 1 point per correct answer). Choose the correct answers:

- 1) Usually, ETFs compared to mutual funds are characterized by lower commissions.
- 2) Usually, ETFs are characterized by a low level of liquidity.
- 3) ETFs track indices of stocks and bonds, there are no ETFs provided for commodity markets.
- 4) In the European Union, a large share of the ETF market (more than 50%) is formed due to the funds of institutional investors (pension funds, insurance companies, endowments, etc.).
- 5) ETFs traded on the Moscow Exchange allow you to invest only in Russian companies.

2.(2 points per correct answer). The public company AAA belongs to the metallurgy sector, the public company BBB produces medicaments. What are the more appropriate beta coefficients for this companies?

	Beta of AAA	Beta of BBB
1)	> 1	> 1
2)	> 1	< 1
3)	< 1	> 1
4)	< 1	< 1

3.(2 points per correct answer). The multiplier $EV/Sales$ of the retail company AAA is 3. The oil company BBB is analogous to AAA. The company BBB has the following financial indicators: Net Income is 5 bln Rub, Sales is 20 bln Rub, the balance value of the Equity is 12 bln Rub, the market value of Debt is 16 bln Rub, the market value of Preferred Shares is 6 bln Rub, Cash and Equivalents are 1 bln Rub.

Олимпиада студентов и выпускников «Высшая лига» – 2020 г.

The market value of equity of the company BBB based on the multiplier EV/Sales of the company AAA is:

- 1) 33
- 2) 38
- 3) 39
- 4) 78

4.(2 points per correct answer).The return rate of the portfolio of stocks is 20%, the standard deviation of the return rate is 12%, the risk-free rate is 5%, the return rate of the stock index is 15%. Indicate the Sharpe ratio of the portfolio:

- 1) 1,25
- 2) 0,42
- 3) 0,83
- 4) 0

5. (2 points per correct answer). Macaulay duration of a corporate bond is 5 years. YTM is 10%. The coupon rate is 8% (per annum). The percent rate in the market declines by 1,5%. How the bond price will change?

- 1) Increases by 6.94%
- 2) Decreases by 6.94%
- 3) Increases by 6.81%
- 4) Decreases by 6.81%
- 5) Increases by 7.5%
- 6) Decreases by 7.5%

6.(2 points per correct answer).The average historic premium between the return rate of the stock market index and the yield of long-term government bonds is 4%. The expected return rate of stocks of the company «AAA» is 11%. The return rate of the stock market index last year was 14%. If the stock market index grows by 1%, it is expected that the stocks of the company «AAA» will grow by 1.3%. According to the CAPM model, investors have no incentives to buy or sell stocks of the company «AAA». What is the current yield of long-term government bonds?

- 1) 10%
- 2) 8,8%
- 3) 7%
- 4) 5,8%

7.(2points). The investor opens a deposit of 300 thousand Rub for 270 days at the Bank «A». The calculation base is 360 days. Bank «A» capitalizes interest payments on the deposit account every 90 days. The interest rate is 6% per annum. What amount (in thousand Rub) will the investor receive at the end of the deposit?

- 1) 313,7
- 2) 318,4
- 3) 313,5
- 4) 318,0

8.(2 points).With a 95% probability for a 2-day period, the maximum loss of the portfolio “Stocks of oil companies” will be 5mlnUSD. Calculate the VaR of this portfolio for a 6-day period and the same probability level:

- 1) 7,1

- 2) 12,2
- 3) 15
- 4) 8,7

9.(2 point per correct answer). Based on the portfolio of stocks AAA and BBB we obtain the following APT model: $E(r) = 12 + 6\beta$, where β is the coefficient of sensitivity to the stock index. The expected return rate on stocks CCC is 17%, the coefficient β is 0.7, the return rate on stocks CCC for the last year is 8%. Is it possible to receive arbitrage profit and how?

- 1) No, it is impossible to receive the arbitrage profit.
- 2) Yes, one can sell the portfolio of stocks AAA and BBB and buy the stocks CCC.
- 3) Yes, one can buy the portfolio of stocks AAA and BBB and sell the stocks CCC.

10.(2 point per correct answer). Выберите правильный ответ, показывающий различие структурной ноты и структурной облигации (инвестиционной облигации, например, ИОС от Сбербанка):

- 1) Инвестиционная облигация это дисконтная облигация с отсутствием купона и негарантированным телом к погашению. Выплата зависит от выполнения того или иного условия (изменение процентной ставки на рынке, изменение курса рубля и т.п.) за весь период жизни облигации
- 2) Инвестиционная облигация и структурная нота - это купонные структурные продукты. Величина купона в обоих случаях зависит от тех или иных условий (событий на рынке) в дату купона.
- 3) Структурная нота и инвестиционная облигация строятся с использованием деривативов.
- 4) Отличия структурных облигаций и нот от обычных облигаций заключается в увязке выплат с динамикой состояния не одного эмитента облигации (сможет или не сможет заплатить), а нескольких. Все другие условия обращения идентичны. Отличие нот от структурных облигаций юридическое (не по величине выплат) и определяется российским или английским правом.

Задачи (всего 30 баллов по специальному блоку. Задачи блока 2)

1. (всего 12 баллов, 3 балла за каждый пункт). Согласно отчетности МСФО по публичной компании ААА, за 2018 г. собственный капитал по балансовой оценке составляет 4 200 тыс.долл., заемный капитал в размере 2 000 тыс долл. привлечен под 8% годовых. Также аналитик нашел, что за 2018 год Sales составляет 15 000 тыс. долл., Gross Profit равна 5 000 тыс. долл., Selling, General and Administrative Expenses (S&GA, без D&A) составляют 2 800 тыс. долл., Depreciation and Amortization 700 тыс. долл. Эффективная и фискальная ставка налога на прибыль равны 20%.

Изменение Net Working Capital за 2018 год составляет 150 тыс. долл. Net capital investments равен 104 тыс. долл., Net borrowing 50 тыс. долл.

Требуемая доходность по собственному капиталу составляет 16%. Собственный капитал по рыночной оценке составляет 10 300 тыс. долл.

Рассчитайте за 2018 год следующие показатели:

- 1) EBITDA и EBIT;
- 2) OCF;
- 3) FCFE;
- 4) ROC и WACC. Эффективно ли работает компания, исходя из соотношения ROC и WACC?

2. (8 баллов). Компания «А» установила годовой дивиденд по привилегированным акциям в размере 10% от номинала. Номинал привилегированной акции - 140 рублей. Требуемая доходность инвесторов по вкладываемому капиталу – 13% годовых.

Рассчитайте справедливую рыночную цену привилегированной акции на 1 января 2020 г. при условии, что дивиденд выплачивается два раза в год, начиная с 1 мая 2020 г.

3. (10 баллов). В данный момент рыночная стоимость акций компании ABC на бирже составляет 100 долл. При этом годовые колл-опционы со страйком 100 торгуются по 8 долл. Годовая процентная ставка на рынке составляет 5,26%.

Какой справедливый коэффициент участия должна иметь нота с защитой капитала сроком на один год и акциями ABC в качестве референсного актива?

Оценка за ответ формируется следующим образом:

1. (3 балла): Из каких финансовых инструментов состоит данная нота?
2. (3 балла): Какая сумма будет направлена на покупку колл-опциона?
3. (4 балла): Каков коэффициент участия?