

**Профили:**

«Финансовые рынки и финансовые институты»

«Стратегическое управление финансами фирмы/  
Strategic Corporate Finance»

КОД – 180-181

Время выполнения задания – 180 минут

**A common part.**

**PART 1 Microeconomics, Macroeconomics.**

Решение задач общей части участники по профилю «Финансовые рынки и финансовые институты» могут представить на английском или русском языках.

Решение задач общей части участники по профилю «Стратегическое управление финансами фирмы/Strategic Corporate Finance» должны представить на английском языке.

**Solve the problems 1 and 2 given below**

**Problem 1 (25 points)**

A monopoly is facing two groups of consumers. The inverse demand function of the first group of customers is described by  $P_1 = 2000 - 20q_1$ . The inverse demand function of the second group of customers is described by  $P_2 = 2500 - 50q_2$ . The number of consumers in the groups is the same. Suppose that firm have estimated the following production function:  $\ln Q = 0,5 \ln K + 0,5 \ln L$ . Assume the structure of factor markets are perfectly competitive. The current market wage rate is \$500 per worker, the price of capital is \$500 per unit.

Question 1-1. (7 points) Find the profit-maximizing prices and quantities, calculate the profits if firm can successfully price discriminate.

Question 1-2. (8 points) Suppose the firm sets a uniform price to maximize profit. Calculate firm's profits. Comparing your answers to (1-1) and (1-2), what choice should the monopolist make?

Question 1-3. (6 points) Compare social welfare in two cases. Demonstrate on a diagram.

Question 1-4. (4 points) Is that an overall result when the monopolist uniform prices are compared with the third degree discriminator prices?

**Problem 2 (25 points)**

Country A is a closed economy. The consumption function for this economy is  $C = 100 + 0.8(Y - T)$ , where C is consumption, Y is income, T is lump sum taxes. There are no income taxes. Government spending on goods and services is fixed at 250, net taxes equal to 250, nominal money supply is 200, autonomous investments equal to 300. The price level in the short term is stable and equal to 1. There are no inflation expectations.

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Suppose that each 1 percent-point increase in the equilibrium interest rate induces a decrease in investment by 5 and the demand for money by 1. Total demand for money consists of transaction demand for money and speculative (or asset) demand for money. The sensitivity of money demand to the changes in income is 0.25.

Question 2-1. (5 points) What are the equilibrium levels of the interest rate  $r$ , income  $Y$ , consumption  $C$  and investment  $I$ ?

Question 2-2. (8 points) Suppose the government wants to finance a 29 increase in government spending by selling bonds. Find new equilibrium values for income and interest rate. Show the initial and subsequent equilibrium on diagram IS-LM. What will happen to investment and savings by household as a result of the government policy?

Question 2-3. (6 points) The central bank decides to intervene in order to prevent the economy from fall of income. How much must the supply money change to keep income at the initial level? Show the changes of equilibrium on the Keynesian cross diagram and diagram IS-LM.

Question 2-4. (6 points) How has the interest rate changed as a result of fiscal and monetary policies? Why? Explain your answer.

### **Special part.**

Выберите и выполните только один из блоков заданий специальной части в соответствии с выбранной вами программой магистерской подготовки.

### **PART 2. «Финансовые рынки и финансовые институты»**

**Test 1. (2 points; 1 point per correct answer). Choose one correct answer among the proposed answers and shade the corresponding oval in the form of answers to the intersection of the question number and answer number:**

1. An advantage of corporate Eurobond markets is that issuers from developing countries can attract a larger amount of financing for a longer period of time, compared to the local corporate bond markets.
2. Usually, corporate bond markets are characterized by a higher level of liquidity than government bond markets.
3. In 2014-2018 in the Russian corporate bond market there was a tendency to increasing concentration: medium-sized and small issuers were leaving the market.
4. Yields on 3-year bonds are more sensitive to changes in inflation forecasts than yields on 10-year bonds.
5. It is incorrect to calculate bond indices by the method of «total return» (i.e. with account of accrued coupon income).

**Test 2. (1 points per correct answer).**

The public company AAA produces beverages and the public company BBB produces luxury clothes and shoes. 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

**Test 3. (2 points per correct answer).**

The multiplier EV/EBITDA of the company AAA is 7. The oil company BBB is analogous to AAA. The company BBB has the following financial indicators: Net Income is 3 bln Rub, EBITDA is 10 bln Rub, the balance value of the Equity is 16 bln Rub, the market value of Debt is 25 bln Rub, Cash and equivalents are 2 bln Rub.

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

- 1) 45
- 2) 47
- 3) 70
- 4) 21

**Test 4. (2 points per correct answer).**

Suppose that the oil company AAA is a resident of the US and the oil company BBB is a resident of a developing country. P/E of the company AAA is 20. Net Income of the company BBB is \$5 bln. Foreign investors decide to buy the 25% share in the equity of the company BBB.

Choose the correct answer about the sum which the investors should pay for the 50% share in the equity of BBB:

- 1) the investors should pay about \$25 bln, the price is based on the method of multipliers.
- 2) the investors should pay less than \$25 bln: the investors prefer the stable macroeconomic environment and low risks.
- 3) the investors should pay greater than \$25 bln: the investors prefer high rates of economic growth.
- 4) the investors can pay less or greater than \$25 bln: the investors will consider other fundamental and non-fundamental indicators of the company BBB, as well as country risks and macroeconomic indicators of the US and of the developing country.

**Test 5. (2 points per correct answer).**

Macaulay duration of a corporate bond is 3 years. YTM is 6%. The coupon rate is 9% (per annum). The percent rate in the market declines by 2%. How the bond price will change?

- |                      |                       |
|----------------------|-----------------------|
| 1) Increases by 5.5% | 4) Decreases by 6%    |
| 2) Decreases by 5.5% | 5) Increases by 5,66% |
| 3) Increases by 6%   | 6) Decreases by 5,66% |

**Test 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 5%. The expected return rate of the shares of the company «AAA» is 12%. The return rate of the stock market index last year was 16%. If the stock market index grows by 1%, it is expected that the shares of company «AAA» will grow by 1.5%. According to the CAPM model, investors have no incentives to buy or sell shares of company «AAA». What is the current yield of long-term government bonds?

- |         |        |
|---------|--------|
| 1) 8,5% | 3) 7%  |
| 2) 4,5% | 4) 11% |

**Test 7. (4 points, 2 points per correct answer).**

An analyst calculated the coefficients of the linear regression of returns of company's shares on the returns of stock market index. As a result, he received the equation:

$$Y = 1,3 * X + 0,06, \quad R^2 = 0,79$$

Which of the following conclusions can the analyst draw from this information? (choose two correct answers)

- |                                    |                         |
|------------------------------------|-------------------------|
| 1) Risk-free rate of return = 6%   | 5) Raw Beta = 0.79      |
| 2) Risk-free rate of return = 7.9% | 6) Raw Beta = 1,3       |
| 3) Risk premium = 1.3%             | 7) Adjusted Beta = 0,87 |
| 4) Required rate of return is 30%  | 8) Adjusted Beta = 1,2  |

**Test 8. (2 points).**

With a 99% probability for a 4-day period, the maximum loss of the investment portfolio "Investment grade bonds" will be 10 mln Rub. Calculate the VaR of this portfolio for an 8-day period and the same probability level:

- |       |       |
|-------|-------|
| 1) 80 | 3) 40 |
| 2) 14 | 4) 7  |

**Test 9. (1 point per correct answer).**

A 7-year, with 9% coupon rate, \$1000 face value bond is currently trading at \$1012. A yield to maturity of this bond must be:

- |                 |                    |
|-----------------|--------------------|
| 1) Less than 9% | 3) Greater than 9% |
| 2) Equal to 9%  | 4) Unknown         |

**Test 10. (1 point per correct answer).**

The concept of the efficient market underlines the great importance of:

- 1) Competition in the market
- 2) The regulatory framework
- 3) Information transparency and rapidity of information transfer
- 4) Liquidity in the market
- 5) Volatility in the market

**Test 11. (1 point per correct answer).**

Модель ценообразования финансовых активов АРТ (Arbitrage Pricing) характеризуется следующими особенностями:

- 1) В отличие от CAPM учитывается не только рыночный риск, но и риск размера, стоимости, т.е. это многофакторная модель с заданным набором факторов риска;
- 2) Учитываются три и более факторов риска, среди которых обязательными являются: бета-риск, риск роста, ликвидности актива;
- 3) Факторы макроэкономического риска расщепляются на несколько и в явном виде рыночный риск не учитывается;
- 4) Это (как и CAPM) однофакторная модель, только учитывается специфический риск, который и порождает арбитраж.

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Задачи (всего 30 баллов по блоку)

*Примечание. Оцениваются не только ответы, но и ход решения, формулы расчета.*

**Задача 1. (всего 12 баллов, 4 балла за каждый пункт)**

Компания «А» рассматривает целесообразность реализации инвестиционного проекта по разработке новой модели автомобиля.

Спрос на продукт прогнозируется на отрезке три года. Проект требует начальных инвестиций в оборудование в размере 900 тыс. долл. (год  $t = 0$ ). Ежегодная амортизация составит 200 тыс. долл. ( $t = 1, 2, 3$ ). В конце третьего года оборудование для производства будет реализовано на рынке с потерей 70% стоимости.

По каждому году ( $t = 1, 2, 3$ ) прогнозируется получение выручки от проекта в размере 3000 тыс. долл., ЕВИТ по проекту в размере 800 тыс. долл. (в ценах соответствующих лет).

Проект требует первоначальных инвестиций в запасы в размере 100 тыс. долл. ( $t=0$ ). Дебиторская и кредиторская задолженность не изменятся.

Эффективная ставка налога на прибыль - 20%.

Ежегодная инфляция, прогнозируемая на ближайшие три года, составит 7%.

Оценка требуемой доходности по собственному капиталу составляет 14%, по заемному – 9%. Собственный капитал составляет по рыночной оценке 15000 тыс. долл., по балансовой 10 000 тыс. долл. Заемный капитал составляет 20000 тыс. долл. Принятие инвестпроекта не меняет уровня риска компании.

А) Рассчитайте свободные денежные потоки FCF по проекту за каждый год (в ценах соответствующих лет).

Б) Рассчитайте номинальную и реальную (по формуле Фишера) ставку WACC по проекту.

В) Рассчитайте NPV по проекту и сделайте вывод о целесообразности его принятия.

**Задача 2. (8 баллов).**

Компания «А» установила годовой дивиденд по привилегированным акциям в размере 12% от номинала. Номинал привилегированной акции - 300 рублей. Требуемая доходность инвесторов по вкладываемому капиталу - 16% годовых.

Рассчитайте справедливую рыночную цену привилегированной акции на 1 января при условии, что дивиденд выплачивается два раза в год: 1 апреля и 1 октября.

**Задача 3. (10 баллов).**

Инвестор вложил 400 тыс. руб. на 185 дней в банк «А». С 1 по 60 день вклада действует ставка 6% годовых, с 61 по 120 день – 6,5% годовых, с 121 по 185 день – 7% годовых. Проценты начисляются в конце каждого подпериода - за первые 60 дней, за вторые 60 дней и за последние 65 дней.

А) Рассчитайте, какую сумму получит инвестор, если заберет деньги из банка «А» по прошествии 185 дней, для двух случаев – когда действует капитализация процентов и когда ее нет.

Б) Рассчитайте, какую доходность получит инвестор в обоих случаях (за 185 дней).

В) Рассчитайте годовую эффективную ставку доходности для обоих случаев.

## PART 2. Corporate Finance

Solve the problems 3 and 4 given below

### Problem #3 (25 points)

BCD company is a no growth firm. It financed with debt capital and equity capital. Equity consists of 1000 shares that are traded today at 500 rubles each. Debt is represented by risky perpetual bonds which offer 6% coupon rate and are traded at a 5% discount of their face value. In total there are 200 bonds and each has a face value of 2000 rubles. The riskfree rate of return is 5%. BCD's management team is considering a capital restructuring decision. They plan to issue additional equity amounted 20000 rubles and will use the proceeds to retire part of existing debt. You believe CAPM holds. Corporate income tax rate which the only market imperfection is 20%.

Unfortunately, you are not given the information regarding the systematic level of risk of BCD's equity and have to deal with comparable companies. WXY company is a perfect candidate for that. WXY's line of business is the same as BCD operates. However, WXY company is 10 times greater in assets. WXY uses two types of capital. One half is equity which has beta of 1,2. The other half is riskless debt. Use an assumption that WXY interest tax savings' systematic level of risk equals to the WXY's unlevered equity systematic level of risk. Return on the market portfolio is 15%.

Suppose, BCD's managers will firstly make the announcement about the whole restructuring plan. Afterwards they will issue shares and, finally, will use the proceedings to buy its own bonds. Assume BCD's debt systematic level of risk doesn't change as a result of capital restructuring. Answer the following questions:

**Question 3.1. (7 points)** Determine the BCD firm value, the BCD stock price and the shareholders' required return after capital restructuring.

**Question 3.2 (6 points)** Determine the difference on the BCD shareholders' required return before and after capital restructuring. Explain where this difference comes from. Present exactly two factors under existing assumptions.

**Question 3.3. (6 points)** Suppose, instead of debt retirement BCD managers decided to use the proceedings from equity issue to pay cash dividends to existing shareholders. Would you as existing shareholder support (be against or neutral) that idea? Explain and illustrate. Mention that we have corporate income tax as the only market imperfection.

**Question 3.4 (6 points)** Suppose there is no corporate income tax any more. Would you expect BCDs' EPS (Earning Per Share) to change as a result of capital restructuring? Explain.

### Problem 4 (25 points)

You are asked to advice on a 10 year maturity investment project. Company ABC plans to implement a project, which will be financed with debt and equity. Shareholders have decided to implement the project with help of a separate new entity – company XYZ. Company XYZ will be created specifically to realize the project.

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You are given the following information regarding the project:

- To start the project ABC needs to invest in XYZ \$95 million as Capital Expenditures (CapEx) and \$5 million as Net Working Capital (NWC) today .
- ABC will finance 90% of required CapEx and NWC using debt and 10% with equity. The company will attract \$40 million as senior debt that carries a 10% rate of interest and \$50 million as subordinated debt that carries a 15% rate of interest. According to the bank agreement the senior debt should be repaid firstly.
- It is assumed that Free Cash Flows to Equity (FCFE), which XYZ will generate during the next 2 years, will be equal to zero.
- At the end of the year 3 ABC will sell XYZ for 3-times Earnings (Net Income), which XYZ will earn in year 3.
- Corporate income tax rate is 35%.
- XYZ does not carry any excess cash and has no non-operating assets.
- You have the following set of projections for XYZ for the following 3 years:

Assumptions for XYZ for the next 3 years (\$ millions)

<b>Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
Sales		105.0	110.3	115.8
Cost of goods sold (COGS)		53.0	55.7	58.5
Sales, General and Administrative Expenses (SG&A)		26.3	27.6	28.9
Depreciation		5.3	5.5	5.8
Earnings before interest and tax (EBIT)		20.4	21.5	22.6
Capital Expenditures (CapEx)	95	6.0	6.2	6.6
Net Working Capital (NWC)	5	5.4	5.8	6.2

Answer the following questions:

**Question 4.1 (6 points)** Calculate Net Income for XYZ in year 1 and estimate Cash Flow, which will be available for senior debt repayment in year 1.

**Question 4.2 (7 points)** Calculate Net Income and Cash Flow, which will be available for senior debt repayment in year 2.

**Question 4.3 (12 points)** Assuming that in year 3 XYZ will not repay the senior debt, please, determine whether the XYZ project should be implemented by ABC, using IRR (Internal Rate of Return) and NPV (Net Present Value). Assume that the required rate of return of shareholders of XYZ is 30%.



