Олимпиада НИУ ВШЭ для студентов и выпускников – 2019 г.

Демонстрационный вариант и методические рекомендации
по направлению «Финансы и кредит»

Профили:
«Финансовые рынки и финансовые институты» КОД – 180
«Стратегическое управление финансами фирмы/
The Strategic Corporate Finance» КОД – 181

Время выполнения задания – 180 мин.

Олимпиадное задание по направлению «Финансы и кредит» для профилей «Стратегическое управление финансами фирмы», «Финансовые рынки и финансовые институты» включает общую часть для всех профилей по данному направлению подготовки и специальные задания для каждого профиля.

Итоговое максимальное количество баллов (100 баллов) распределены между общей частью (50 баллов) и специальной частью (50 баллов). Общая часть содержит задания по микроэкономике и макроэкономике: 1 задача по макроэкономике (25 баллов) и 1 задача по микроэкономике (25 баллов). Текст заданий общей части подготовлены на английском языке.

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»** должны представить на английском языке.

Специальные задания для каждого профиля содержат:
«Финансовые рынки и финансовые институты» - 3 тестовых задания и 2 задачи.
«Стратегическое управление финансами фирмы» - 2 задачи по 25 баллов каждая.

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

Решение задач специальной части участники по профилю **«Стратегическое управление финансами фирмы»** должны представить на английском языке.

Участники Олимпиады по направлению «Финансы и кредит» выполняют общую часть олимпиадного задания и **одно** из специальных заданий по своему выбору.

<u>A common part</u>
PART 1 Microeconomics, Macroeconomics
Solve the problems given below
Problem 1 (25 points)

Robinson Crusoe lives on the island and catches 2 centners of raw fish during a month. Robinson does not eat raw fish, but he cooks fish steaks out of it. The dependence of the number of steaks produced on fish has the form $x(y)=\sqrt{y}$, where y is the weight of fish in centners, x - the weight of steaks in centners.

Question 1-1. (6 points) Analytically describe the production capabilities of Robinson, draw a production possibility curve of Robinson in the coordinates of "steaks" - "raw fish", and show the equilibrium point of Robinson on the curve.

Question 1-2. (14 points) Robinson met one of the local people, whose preferences are described by the following utility function: $U_t = X_t^2 Y_t$, where X_t is the number of steaks that the local person will eat, and Y_t - the number of raw fish that the local person will eat. A local person catches 3 centners of raw fish during a month, and does not know how to cook steaks. Robinson suggested that he and the local person organize trade. We assume that both agents act as perfect competitors.
Question 1-2-a. (6 points) Find the Robinson demand function for raw fish obtained from the local person.
Question 1-2-b. (4 points) Find the local person supply function of raw fish.
Question 1-2-c. (4 points) Find the equilibrium value of the price of raw fish, expressed in the number of steaks, and determine the price elasticity of supply at the equilibrium.

Question 1-3. (5 points) Is it true that the exchange has brought benefits to each of the agents? Justify your answer.

Problem 2 (25 points)
We consider a closed economy. The price level in the short term is stable and equal to 1, there are no inflation expectations. The consumption function for this economy is C = 150 + 0.8 (Y-T), where Y is the income, T means lump sum taxes. There are no other taxes and transfers in economy. Investment function is given as I = 30 - 20r, where r is the interest rate, which is measured in percentages. The public budget is balanced and government spending on goods and services is fixed at G = 100. The sensitivity of the money demand to changes in income and interest rates are 2 and 50, respectively. The nominal money supply is 1000.

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 that government reduces the government spending by 20. Find new equilibrium values for income and interest rate. Show the initial and subsequent equilibrium on the Keynesian cross diagram and diagram IS-LM.

Question 2-3. (6 points) The central bank decides to intervene in order to prevent the economy from fall of income. By how much must the supply money be changed, if income has to remain 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.

<u>Special part</u>

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»

Multiple choice question 1.
(2 point for each correct answer. The maximum number of points - 6). Investor considers a wide variety of investment classes (A – Long-term government bonds, B- Long-term corporate bonds, C – US Inflation, D – Common stocks, E – Small cap stocks, F- US Treasure bills). There is clear evidence for him of a positive relationship between the variance in returns and the average returns on investment classes. Help investor to find a match between the average return and the standard deviation of return and asset class (fill in the table).

	investment classes	average annual return (%)	standard deviation of return (%)
A	**?**	**12,4**	**20**
B	**?**	**17,6**	**36**
C	**?**	**5,5**	**8**
D	**?**	**5,1**	**8,2**
F	**?**	**3**	**3,5**
E	**?**	**2,1**	**4,5**

A) **(2 point)** For investment class A – Long-term government bonds correct assessment of risk and return is
1) a
2) b
3) d
4) c
B) **(2 point)** For investment class E – Small cap stocks, correct assessment of risk and return is
5) a
6) b
7) e
8) d
C) **(2 point)** For investment class F- US Treasure bills, correct assessment of risk and return is
9) a
10) f

Multiple choice question 2.

(The maximum number of points - 6). Financial analyst of independent company "Invest&Goodwelth" has a task to make fundamental analysis of shares of three companies, which operate in different industries: consumer sector, retail and financial sector. Traditionally, two approaches are employed in the analysis. Help him make a correct choice of analysis algorithm (choose the most correct recommendations) and possible values of input parameters. Choose single recommendation in A, B, C, D and E:

A) **(1 points)** Two approaches applied in fundamental analysis are**:**

1) Income and cost;
2) Cash flow and comparative.

B) **(1 points)** Key elements of income approach are:

3) Forecast of cash flows and estimation of their risk (probability of receiving specified flows);
4) Technical Analysis with calculation volume of trade, balance liquidity and financial stability ratios based on the company's financial statement.

C) **(1 points)** It is recommended to choose beta coefficient for shares of a consumer sector company from the range**:**

5) From 0,5 to 0,9;
6) From 1,41 to 2.

D) **(2 points)** If a company operates with lower financial leverage than most companies in the industry, beta coefficient for its shares is adjusted**:**

7) By increase in base (industrial) value;
8) By decrease in base (industrial) value.

E) **(1 points)** It is important to construct multiples of proper types. It is recommended to choose multiples of the following types:

9) "MV/BV", "EV/EBITDA";
10) "Market capitalization/Operating profit", "Market capitalization/Sales".

Multiple choice question 3.

(The maximum number of points - 8). Investors evaluate investments in real assets. Help him decide on the classes of investment assets and the choice of methods

A) **(1 points)** By real assets include

1) starting a business through the purchase of the industrial site, equipment, vehicles
2) purchase shares of the company real (non-financial) sector of the economy

B) **(1 points)** The payback period of the investment project is:

3) the lifetime of the project
4) the period in which the NPV becomes positive
5) the period of receipt of the net cash flows that compensate originally invested capital

C) **(3 points)** If the project's cash flows are estimated at base year prices (prices of the purchasing power of the year 0), then the discount rate should be chosen:

6) the real interest rate in the market, taking into account the risk
7) the nominal interest rate in the market, taking into account the risk
8) the risk-free rate

D) **(3 points)** The following data forecast has investor for the year 2015 with the company's "A" investment project: the operating profit (EBIT) = $ 890 million. The effective income tax rate is 24%. Capital expenditures (CapEx) = $ 450 million. Depreciation (Dep., Am) = $ 400 million. Net working capital in the beginning 2015 will be $ 218 million and in the beginning 2016 will be $ 300 million. The forecasting free cash flow of project in 2015 will be:

9) $ 544,400,000.
10) $ 708.4 million.

Решите задачи (нумерация задач продолжается после общей части).

Задача 3. (15 баллов).

Инвестор вложил 600 тыс. руб. на 380 дней в банк «А». С 1 по 190 день вклада действует ставка 9,5% годовых, с 191 по 380 день – 13% годовых. Проценты начисляются в конце срока действия вклада, нет капитализации процентов, все проценты начисляются только в конце срока действия вклада. По вкладу в банке «А» у вкладчика есть возможность досрочного расторжения через 190 дней без потери процентов. Спустя 190 дней после начала действия вклада процентная ставка в экономике заметно выросла. Банк «Б» теперь предлагает сделать вклад на 190 дней под 12,95% годовых, банк «А» новых предложений не делал.

1) Рассчитайте, сколько получит инвестор, если заберет деньги из банка «А» по прошествии 190 дней.
2) Какой вариант принесет инвестору большую доходность: оставить деньги в банке «А» до окончания полного срока вклада (380 дней) или забрать деньги из банка «А» по прошествии 190 дней без потери процентов и вложить их в банк «Б» на 190 дней? Для простоты считать, что во втором варианте инвестор заберет деньги из банка «А» ровно на 190 день, и следующий день будет первым днем действия вклада в банке «Б».
3) Рассчитайте годовую эффективную ставку доходности по обоим вариантам.

Задача 4. (15 баллов).

Портфель, составленный из облигаций компании «А» и облигаций компании «Б», имеет дюрацию 3 года. Доля облигаций компании «А» в портфеле составляет 73%, их дюрация равна 1,89 года, по ним выплачивается купон 12% в год. Облигации компании «Б» бескупонные, при текущем курсе они демонстрируют доходность к погашению 10% годовых. Найти срок до погашения облигаций компании «Б».

Part 2. CORPORATE FINANCE

Problem numbering is continued after Part 1.

Provide all solutions in English!

Problem 3 (25 points)

At the end of your internship at a well-known consulting firm you were asked to give a professional opinion on a potential investment opportunity at Zion limited liability company. The project is about producing and selling new keys. Zion management team plans to implement the project that will be financed with debt and equity. Most of Zion's shareholders are individual portfolio investors except the ArchitectFund who owns 20% of equity capital. Zion's equity is represented by 500 common shares. Zion company has a well-established relationship with AgentBank which has long history of providing debt financing. The Zion's management team follows a belief that optimal Debt/Equity ratio should be 0,5. Required rate of return on unlevered Zion's equity capital is 25%. However, the new investment opportunity is about the same level of risk as existing Zion's operations, it was decided to implement the project with a help of creating a new business entity – Keymaker limited liability company. The Keymaker company will be created specifically to realize the project. Shareholder structure of the Keymaker company is supposed to be the same as existing Zion's shareholder structure.

You are given the following info regarding the project:

Project has 4 years maturity. Sales are expected to be 600 mln. cpt. per year for the next four years. (cpt. stands short for "CriPTa" which is the local currency).

COGS (excluding depreciation expense) will comprise 40% of Sales. Capital expenditures will reflect acquisition of equipment for 720 mln. cpt. Newly acquired machinery will be depreciated over 4 years of useful life using straight-line approach to its residual book value of 120 mln. cpt. Net working capital management guidelines require current assets to be at 20% of expected Sales in a corresponding year. Current liabilities are planned to be at 15% of expected COGS in a corresponding year. Corporate income tax rate is 20%. The Keymaker company will be financed with same capital structure as Zion company.

AgentBank as well as other potential debtholders agrees that a fair rate of return on Zion's debt is 10%. The risk free rate is 5%. Suppose there are perfect capital markets. The only imperfection is corporate income tax.

Question 3-1. (15 points) Is the described above investment opportunity efficient? Formulate your professional opinion using WACC approach (Weighted Average Cost of Capital). Calculate NPV of the project and advise whether the project should be implemented.

Question 3-2. (5 points) Suppose the NPV of the project happened to be positive and Zion's management team decided to implement it. After one year of operations the ArchitechFund which is only strategic Keymaker's investor, offers capital restructuring plan. The plan proposes to decrease the Debt/Equity ratio from existing level of 0,5 to a new lower level. Additional common shares will be issued. The cash proceeds from equity issue will be used to retire half of existing Keymaker's debt. Individual portfolio shareholders of the Keymaker company are concerned with the fact that all shareholders will suffer a decrease in expected dividend payments as result of capital restructuring. Please, provide exactly 2 reasons to explain why individual shareholders are correct about their concern.

Question 3-3 (5 points) Suppose the capital restructuring plan discussed in previous question was implemented at the beginning of the second year of running the key project. After realizing a decrease in dividend payments the ArchitectFund proposes to double the expected dividend per share amount at the end the third year of operations. Individual portfolio investors don't support that idea because there is no reason to expect the operating cash flow to increase. However, the ArchitectFund offers to ussie new additional shares to finance the proposed one-time increase in dividends. Please, evaluate the ArchitectFund's proposal from shareholders' standpoint.

Problem 4. (25 points)
Company ABC is a mature firm. ABC reported sales of \$12 000 million in 2017. In this year ABC had EBITDA margin (EBITDA/Sales) of 25%, operating profit margin (EBIT/Sales) of 16%, and net profit margin (Net Income/Sales) of 10%. The corporate tax rate was 20%. ABC's investments in fixed assets were 11% of sales, investments in net working capital (NWC) were 3% of sales, and the level of depreciation in this year was 9% of sales. Interest expenses were only 3.5% of sales. It is also known, that 20% of investments in fixed assets and NWC were financed with long-term debt. The book value of ABC's long-term debt is \$4 200 million, and its market value is \$3 700 million. The yield to maturity (YTM) of corporate bonds is 10%. There are 250 million shares outstanding (trading at \$46 per share), with a book value of \$10 000 million. The unlevered beta coefficient of comparable companies is 0,9. The risk free rate is 5.75%. The market risk premium is 4,95%. It is assumed that long-term debt is risk free.
Question 4-1. (10 points) Calculate ABC's FCFE and FCFF for the year 2017.
Question 4-2 (10 points) Calculate the value of equity for ABC Company on the 01.01.2018, using FCFE model.
Question 4-3 (5 points) Taking into account the ABC's perspective in the future, please, justify, whether ABC's long-term debt level will be the same, will decline or will increase. Please, show changes in long-term debt, which ABC attracts to finance its investments in fixed assets and NWC, in next 3 years.