

Профиль:
«Финансовые рынки и финансовые институты»
«Стратегическое управление финансами фирмы/
The Strategic Corporate Finance»

КОД – 180

КОД – 181

Решения и ответы

PART 1 Microeconomics, Macroeconomics

Criteria for checking task in microeconomics (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?

Solution:

Question 1-1. (7 points)

This is an example of third degree price discrimination.

$$\max \pi = TR - TC = TR_1 + TR_2 - TC(q_1 + q_2)$$

Production function is $Q = K^{0,5} L^{0,5}$ (monotonic transformation, taking logarithms)

$$\ln(L^{0,5} K^{0,5}) = 0,5 \ln L + 0,5 \ln K$$

The long run total cost function for this production function is given by

$$TC(q, w_1, w_2) = 2q(w_1 w_2)^{1/2} = 2q(500 * 500)^{1/2} = 1000q \quad \text{(2 points)}$$

Marginal costs are constant in each market:

$$MC=1000$$

(1 point)

Profit maximization condition is:

$$MR_1=MR_2=MC$$

Solve these two problems separately (each market demand is independent).

$$MR_1=2000-40q_1=1000$$

$$q_1=25$$

$$p_1=1500 \text{ (1,5 point)}$$

$$MR_2=2500-100q_1=1000$$

$$q_1=15$$

$$p_1=1750 \text{ (1,5 point)}$$

Total profit is computed by calculating the function below using optimal price and output (sales) values:

$$\pi=1500*25+1750*15-1000*(25+15)=23750 \text{ (1 point)}$$

The score is reduced by 1 point if at least one arithmetic error is occurred.

Question 1-2. (8 points)

If monopolist is not price-discriminative (uniform pricing), aggregate demand is:

$$Q=50-0,02p \text{ for } 2000 \leq p \leq 2500$$

$$Q=150-0,07p \text{ for } p < 2000 \text{ (1 point)}$$

Demand indirect function:

$$P=2500-50Q \text{ for } Q \leq 10$$

$$P=2142,9-14,3Q \text{ for } Q > 10 \text{ (1 point)}$$

Marginal revenue is:

$$MR=2500-100Q \text{ for } Q \leq 10$$

$$MR=2142,9-28,6Q \text{ for } Q > 10 \text{ (1 point)}$$

Set $MR = MC$

$$Q=40 \text{ (1 point)}$$

Price is than: $P=1571,4$ **(1 point)**

$$\text{Profit} = 1571,4*40 - 1000*40 = 22856 \text{ (1 point)}$$

Therefore, firm tend to be price-discriminative. **(2 point)**

The score is reduced by 1 point if at least one arithmetic error is occurred.

Question 1-3. (6 points)

The graph below depicts the third degree price discrimination strategy (Figure 1.)

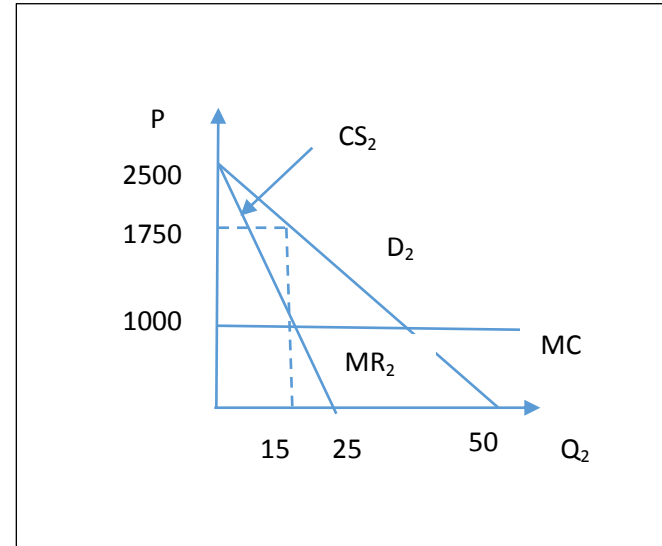
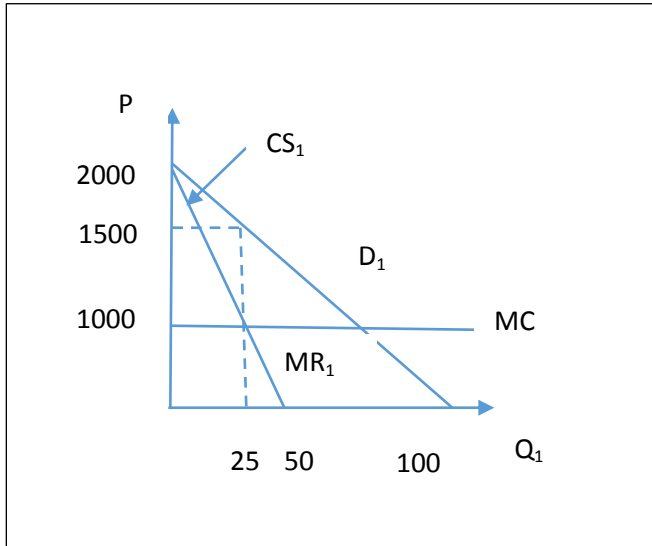


Figure 1. (1 point)

$$W = cs + ps = cs + \pi = 0,5 * 500 * 25 + 0,5 * 750 * 15 + 23750 = 35625 \text{ (2 point)}$$

The monopolist is price-discriminative (uniform pricing):

$$W = 0,5 * 500 * 10 + 0,5 * (10 + 40) * 429 + 22856 = 36081 \text{ (2 point)}$$

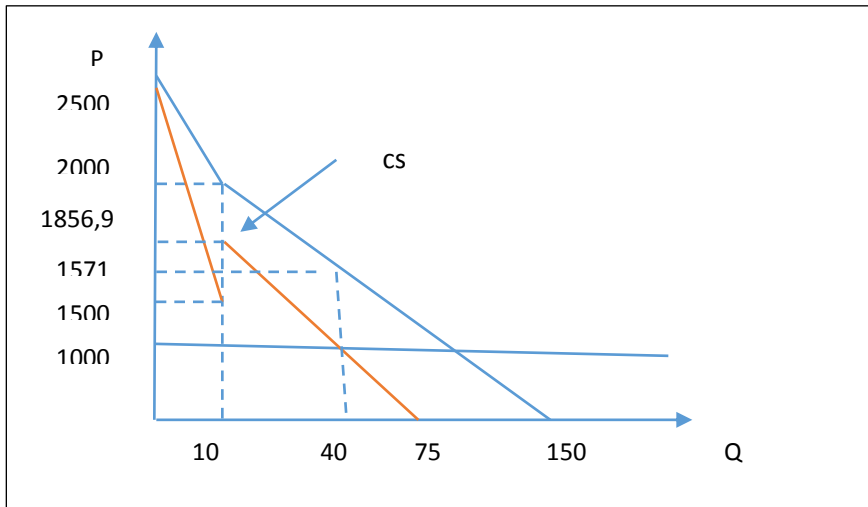


Figure 2. (1 point)

The score is reduced by 1 point if at least one arithmetic error is occurred.

Question 1-4. (4 points)

Previous analysis assumes that the same markets are served with and without price discrimination. This may be not true:

- uniform price is affected by demand in “small” markets;
- firm may then prefer not to serve such markets without price discrimination;
- price discrimination may open up “small” markets.

The result can be an increase in aggregate output and an increase in welfare. In general, if total output higher under third degree price discrimination condition, welfare is increased respectively.

Criteria for checking task in macroeconomics (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.

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 increase in price level. 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.

Solution:

Question 2-1. (5 points)

$$IS_1: Y = 100 + 0,8(Y - 250) + 300 - 5R + 250$$

$$IS_1: Y = 2250 - 25R$$

$$LM: 200 = 0,25Y - R$$

$$LM: Y = 800 + 4R$$

$$IS_1 = LM$$

$$2250 - 25R = 800 + 4R \quad (1 \text{ point})$$

$$R_1 = 50$$

$$Y_1 = 1000 \quad (2 \text{ points})$$

$$C(Y=1000) = 100 + 0,8(1000 - 250) = 700 \quad (1 \text{ point})$$

$$I(R_1=50) = 300 - 5 \times 50 = 50 \quad (1 \text{ point})$$

The score is reduced by 1 point if at least one arithmetic error is occurred.

Question 2-2. (8 points)

The government increases budget spending by 29, financing with loans in financial market. At the same time, there is no loan provided by central bank, so the money supply remains unchanged.

$$IS_2: Y = 100 + 0,8(Y - 250) + 300 - 5R + 250 + 29 \quad (2 \text{ points})$$

$$IS_2: Y = 2395 - 25R$$

$$IS_2 = LM$$

$$2395 - 25R = 800 + 4R$$

New equilibrium values for income and interest rates:

$$Y_2 = 1020; R_2 = 55 \quad (2 \text{ points})$$

$$\Delta I = -5 \times (55-50) = -25 \quad (2 \text{ points})$$

$$\Delta Y_d = \Delta Y = 20$$

$$\Delta S = 0,2 \times \Delta Y$$

$$\Delta S = 0,2 \times 20 = 4 \quad (2 \text{ points})$$

The score is reduced by 1 point if at least one arithmetic error is occurred.

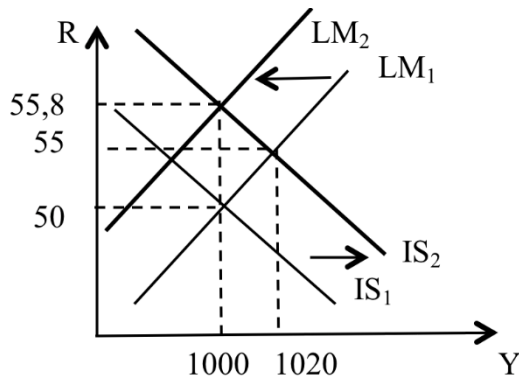
Question 2-3. (6 points)

$$IS_2 (Y=1000): 1000 = 2395 - 25R \quad \square \quad R=55,8 \quad (1 \text{ point})$$

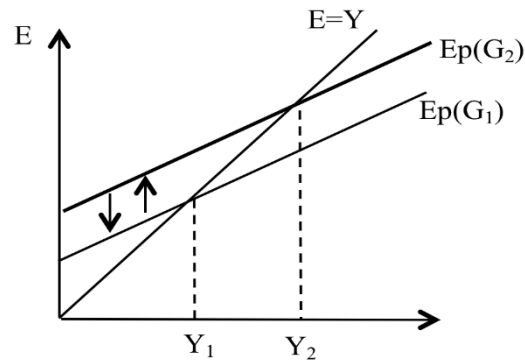
$$LM_2: M_2 = 0,25Y - R$$

$$M_2 = 0,25 \times 1000 - 55,8 = 194,2 \quad (1 \text{ point})$$

$$\Delta M_s = 194,2 - 200 = -5,8 \quad (2 \text{ points})$$



(1 point)



(1 point)

Question 2-4. (6 points)

Fiscal and monetary policy led to increases in interest rate two times.

1) The increase in government spending is provided by the state budget deficit growth. The state budget deficit is financed by loans on financial market. The consequences of such a policy can be considered either on the stock market model or on the money market model, since these markets are balanced at the same interest rate:

$B^s + M^s = B^d + M^d$, тогда $B^s - B^d = M^d - M^s$ (excess supply on the stock market would be balanced by excess money demand)

- The supply of the government bonds in the stock market is growing (the interest rate is vertical axis, the supply of bonds is equivalent to the demand for debt capital L_d) bonds' price falls while the interest rate rises:

$$G \uparrow \Rightarrow \frac{Bond^s \uparrow \Rightarrow Bond^s > Bond^d \Rightarrow P_{bond} \downarrow \Rightarrow R \uparrow}{Ep \uparrow \Rightarrow Y \uparrow} \Rightarrow IS \rightarrow$$

Or

$$G \uparrow \Rightarrow Ep \uparrow \Rightarrow IS \rightarrow; \text{multiplicatively } Y \uparrow \Rightarrow Md \uparrow \Rightarrow R \uparrow$$

(4 points)

2) Central Bank policy aimed to control and prevent price increases

$$M^s \downarrow \Rightarrow R \uparrow \Rightarrow LM \leftarrow$$

The Central Bank interventions enhanced interest rates growth.

(2 points)

PART 1 «Финансовые рынки и финансовые институты»

ТЕСТЫ (всего 20 баллов по блоку)

Критерии проверки тестов: количество баллов за верные ответы на вопросы теста указано ниже для каждого вопроса. Верные ответы выделены полужирным шрифтом. За неправильный множественный выбор ответов («лишние» ответы) оценка снижалась на 1 балл.

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

- 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. (2 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 | 3) 70 |
| 2) 47 | 4) 21 |

Решение: для компании BBB рассчитаем $EV = 7 \cdot 10 = 70$ млн руб.

Т.к. $EV = MC + Debt - Cash \text{ and equivalents}$, то $MC = 70 - 25 + 2 = 47$ млн руб.

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 25% share in the equity of BBB:

- a) the investors should pay about \$25 bln, the price is based on the method of multipliers.
- b) the investors should pay less than \$25 bln: the investors prefer the stable macroeconomic environment and low risks.
- c) the investors should pay greater than \$25 bln: the investors prefer high rates of economic growth.
- d) 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%
- 2) Decreases by 5.5%
- 3) Increases by 6%
- 4) Decreases by 6%
- 5) Increases by 5,66%**
- 6) Decreases by 5,66%

Решение: $MD = \frac{D}{(1+r)}$

$$MD = 3 / (1 + 0,06) = 2,83$$

$$\frac{\Delta P}{P} \approx -MD * \Delta r$$

$$\text{Изменение цены} = +2,83 * 2\% = +5,66\%$$

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% |

Решение. По условию $12\% = r_f + 1,5 * 5\%$; следовательно, $r_f = 4,5\%$.

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:

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

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 |

Решение. Из приведенной формулы следует, что Raw Beta = 1,3.

$Adjusted\ Beta = 0,67 * Raw\ Beta + 0,33 = 1,2.$

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 |

Решение. $VaR(8\ \text{дней}, 99\%) = (\sqrt{8} / \sqrt{4}) * VaR(4\ \text{дня}, 99\%) = 1,4 * 10 = 14\ \text{млн руб.}$

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%**
- 2) Equal to 9%
- 3) Greater than 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.

Задачи (всего 30 баллов по блоку)

Примечание. В задачах 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.

Решение

$$A) FCF(t = 0) = -\Delta NWC - Capex = -900 - 100 = -1000 \text{ млн долл}$$

$$FCF(t=1, 2) = EBIT \cdot (1 - Tax) + D \& A - Capex = 800 \cdot (1 - 0.2) + 200 = 840 \text{ млн долл}$$

Третий год – высвобождение оборотного капитала и продажа оборудования

$$FCF(t=3) = 800 \cdot (1 - 0.2) + 200 + 100 + 900 \cdot 0.3 = 1210 \text{ млн долл}$$

$$B) \text{ Номинальная ставка WACC} = k_e \cdot E / (D + E) + k_d \cdot D / (D + E) \cdot (1 - Tax) = 14\% \cdot 15 / 35 + 9\% \cdot 20 / 35 \cdot (1 - 0.2) = 10,11\%$$

$$\text{Реальная ставка WACC} = (1 + \text{WACC номинал}) / (1 + \text{инфл}) - 1 = (1 + 0.1011) / (1 + 0.07) - 1 = 2,9\%$$

$$B) NPV = -1000 + 840 / 1,1011 + 840 / 1,1011^2 + 1210 / 1,1011^3 = 1362 \text{ млн долл} > 0, \text{ следовательно, проект нужно принять.}$$

Комментарии по критериям оценки.

За каждый верно решенный пункт – 4 балла.

А) Если один из денежных потоков был рассчитан некорректно, а другие правильно, то оценка составляла 3 балла. Если использовалась некорректная формула расчета FCF по нескольким годам, то максимальная оценка составляла 2 балла.

Б) Если применялась приближенная формула $WACC_{реал} = WACC_{номинал} - инфляция$, то максимальная оценка составляла 3 балла. Если было неверно найдено одно из значений WACC (номинальная или реальная ставка), то максимальная оценка составляла 2 балла.

В) Если использовалась неверная ставка дисконтирования (или были приведены одновременно два противоречащих друг друга ответа с разными ставками), то максимальная оценка составляла 3 балла. Если были ошибки в формуле NPV, то максимальная оценка составляла 2 балла.

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.

Решение:

Размер годового дивиденда составляет $0,12 \cdot 300 = 36$ руб. По условию выплачивается 18 руб. раз в полгода.

Требуемая полугодовая доходность $r = \sqrt{1 + 0,16} - 1 \approx 0,07703$

Если бы дивиденд платился в конце каждого календарного полугодия, была бы $PV = 18/0,07703 \approx 233,68$. Но необходима корректировка с учетом выплат 1 апреля и 1 октября.

Требуемая квартальная доходность $r_{кв} = \sqrt[4]{1 + 0,16} - 1 \approx 0,0378$

Искомая $PV \approx (233,68 + 18)/1,0378 \approx 242,51$ руб.

Критерии оценки. Если верно было найдено только значение годового и/или полугодового дивиденда, то оценка составляла 2 балла.

Если были построены неверные формулы, подразумевающие выплату номинала 300 рублей через 1 год и дальнейшее прекращение денежных потоков (например, формулы вида $18/1,08 + 18/1,16 + 300/1,16$ и др.), по аналогии с однолетними облигациями, то максимальная оценка составляла 3 балла.

Если расчет был проведен по формуле Гордона с неверной предпосылкой о выплате дивидендов раз в год и найдена $PV = 36/0,16 = 225$ руб, то максимальная оценка составляла 4 балла.

Если расчет был проведен по формуле Гордона с неверной предпосылкой о выплате дивидендов 1 раз в конце каждого полугодия и найдена $PV = 18/0,077=233,68$ руб, то максимальная оценка составляла 5 баллов.

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.

Решение

В качестве базы расчета допустимо выбрать период 365 или 360 дней. В настоящем решении будем использовать 365 дней.

А) Без капитализации процентов инвестор получит

$$400\,000 \cdot (1 + 0,06 \cdot 60/365 + 0,065 \cdot 60/365 + 0,07 \cdot 65/365) \approx 413\,206 \text{ руб.}$$

С капитализацией процентов инвестор получит:

$$400\,000 \cdot (1 + 0,06 \cdot 60/365) \cdot (1 + 0,065 \cdot 60/365) \cdot (1 + 0,07 \cdot 65/365) \approx 413\,351 \text{ руб.}$$

Б) Доходность за 185 дней.

Без капитализации процентов:

$$(0,06 \cdot 60/365 + 0,065 \cdot 60/365 + 0,07 \cdot 65/365) = 3,3014\%$$

С капитализацией процентов:

$$(1 + 0,06 \cdot 60/365) \cdot (1 + 0,065 \cdot 60/365) \cdot (1 + 0,07 \cdot 65/365) - 1 \approx 3,3377\%$$

В) Годовая эффективная ставка.

$$\text{Без капитализации процентов: } 3,3014\% \cdot 365/185 \approx 6,51\%$$

$$\text{С капитализацией процентов: } 3,3377\% \cdot 365/185 \approx 6,59\%$$

Критерии оценки. Пункты А и В оценивались в 4 балла, пункт Б – в 2 балла.

Если один из ответов в пункте А и В был найден неверно, то максимальная оценка за этот пункт составляла 2 балла.

Если один из ответов в пункте Б был найден неверно, то максимальная оценка за этот пункт составляла 1 балл.

PART 2. «Стратегическое управление финансами фирмы/The Strategic 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 WYX interest tax savings' systematic level of risk equals to the WYX'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.

Solution & comments:

3.1

Company will lose part of existing PVTS. Shareholder value will decrease by $\Delta PVTS = \text{debt retired} * \text{corporate income tax} = 20000 * 0,2 = 4000$

BCD Firm value (2 points) $= 500 * 1000 + 0,95 * 200 * 2000 - \text{lost PVTS} (4000) = 500000 + 380000 - 4000 = 876\ 000$

Share price will react as soon as information becomes available. Equity value will decrease by 4000 before additional equity issue.

$$\text{Stock price (1 points)} = (500\,000 - 4000) / 1000 = 496$$

To come up with BCD equity new required return, we need to find the unlevered equity required return of our comparable WXY firm. Keeping in mind offered assumptions we develop unlevered equity beta

$$\text{Unlevered equity beta WXY} = \text{Beta of PVTS WXY} = 1/2 * \text{Beta debt WXY} + 1/2 * \text{Levered equity beta WXY} = 0,6$$

$$\text{Unlevered equity WXY required return} = \text{Unlevered equity BCD required return} = 0,05 + 0,6 * (0,15 - 0,05) = 0,11$$

$$\text{New levered BCD required return (4 points)} = 0,11 + (360000/516000) * (0,11 - 0,0632) * (1 - 0,2) = 0,1361$$

$$\text{Value debt after restructuring} = 380000 - 20000 = 360000$$

$$\text{Value debt equity restructuring} = 500000 - 4000 + 20000 = 516000$$

$$\text{Cost of debt} = 1000 * 0,06 / 1900 = 0,0632$$

3.2

$$\text{Required return of BCD equity before restructuring} = 0,11 + (380000/500000) * (0,11 - 0,0632) * (1 - 0,2) = 0,1385$$

$$\text{Difference (1 point)} = 0,1385 - 0,1361 = 0,0024$$

Reason 1 (2 points) – discussion of redistribution of systematic risk because of changes in PVTS, which should always be less risky than levered equity.

Reason 2 (3 points) - discussion of redistribution of systematic risk because of changes in value of debt, which should always be less risky than equity

3.3

This is pure payout related question. Corporate income tax will not change the motivation – shareholders will consider this as a neutral action. Existing shareholders will not gain or lose if all issues are supposed to be performed at fair prices. Greater number of shares will be balanced by additional dividend. 6 points is given to an answer with reference to MM irrelevance with illustration

3.4

A good answer for 6 points to that question would include a discussion around the sources of EPS changes under pure PCM conditions. If you mention the fact that shareholders wealth would not change under pure PCM – this is not enough. Under MM, a decrease of leverage would result in decrease in EPS. Net Income will increase, number of shares increase and value of stock will not

change. The best way would be to illustrate the irrelevance MM result which build under no arbitrage condition

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.

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)

Year	0	1	2	3
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%.

Solution:

4.1

$$NI_1 = [20.4 - (40 \cdot 0.1 + 50 \cdot 0.15)] \cdot 0.65 = 5.79 = 5.8 - \mathbf{3 \text{ points}}$$

$$FCFE = NI + D, A - CapEx - \Delta NWC + NewDebt - Debt \text{ Repayment}$$

Since shareholders will not receive anything (during the 3 year period), everything goes to debtholders to decrease the outstanding debt. FCFE = 0. There are no additional debt issues. So it is important how do we come up with changes in debt (which are negative)

$$Debt \text{ Repayment}_1 = 5.8 + 5.3 - 6 - (5.4 - 5) = 4.7 - \mathbf{3 \text{ points}}$$

4.2

$$NI_2 = [21.5 - ((40 - 4.7) \cdot 0.1 + 50 \cdot 0.15)] \cdot 0.65 = 6.8 - \mathbf{4 \text{ points}}$$

$$Debt \text{ Repayment}_2 = 6.8 + 5.5 - 6.2 - 0.4 = 5.7 - \mathbf{3 \text{ points}}$$

4.3

$$NI_3 = [22.6 - ((40 - 4.7 - 5.7) \cdot 0.1 + 50 \cdot 0.15)] \cdot 0.65 = 7.9$$

$$FCFE_3 = 7.9 + 5.8 - 6.6 - 0.4 = 6.7$$

$$IRR \text{ for FCFE: } \quad 2009 \text{год} = -(95 + 5) \cdot 0.1;$$

$$2010 \text{год} = 0$$

$$2011 \text{год} = 0$$

$$2012 \text{год} = 7.9 \cdot 3 = 23.7 + 6.7 = 30.4$$

IRR = 45% , which is > 30% - **6 points**

$$NPV = -(95 + 5) \cdot 0.1 + 30.4 / 1.3^3 = 3.84 - \mathbf{6 \text{ points}}$$