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

Направление «Экономика»

Профиль: «Экономика» **КОД – 110**

Время выполнения задания – 180 мин., язык – русский/английский.
Максимальное количество баллов - 100.

Решите задачи. Веса задач приведены в скобках

Инструкции

- Решение может быть представлено как на русском, так и на английском языке. Никаких дополнительных баллов, впрочем, как и штрафов, за решение на английском языке не предусмотрено.
- Решение должно быть хорошо структурированным, изложено грамотным языком, а почерк – распознаваемым. Ответы на качественные вопросы должны быть убедительно аргументированы, но длинные рассуждения, не относящиеся к сути дела, могут негативно повлиять на оценку.
- Все шаги в решении должны быть обоснованы, все вычисления должны присутствовать в работе. Разрешено пользоваться личным бухгалтерским калькулятором.
- Черновики не предусмотрены, решение сразу оформляется на чистовик.
- Если приведенное решение является неверным, перечеркните его (перечеркнутое решение не проверяется) и приведите корректную версию.
- При наличии нескольких вариантов решения одного и того же задания, проверяющий сам определяет, какое из решений подлежит проверке, а апелляции с просьбой проверить другой вариант решения не принимаются.

1. (40 points) Answer the following short questions

a) (8 points) Consider an industry in which N firms ($N > 2$) compete by Cournot. The inverse function of industry demand $p(Y)$ is differentiable and decreases. The average and marginal costs of each firm are constant and positive, but different across firms. Prove that the Cournot equilibrium output of the industry Y^C is a function of the sum of the marginal costs, and is independent of the distribution of marginal costs among the firms as long as $p(Y^C)$ exceeds the marginal costs for each firm.

b) (12 points) The Dauri Island is inhabited by two tribes, Auri and Bauri, that practice coconut farming. The Auri tribe lives on the western side of the island, while the Bauris live on the eastern side. The harvest of coconuts is always larger in that part of the island which is closer to a warm current Mustrim that can wash the island either from the west or from the east. If the warm current heats the western side of the island, then the Auris harvest of coconuts will be 12, while the Bauri tribe will get only 6. If the current goes near the eastern side of the island, then the Auri tribe will have just 4 coconuts, while the Bauris will get 11. Both Auri and Bauri chiefs believe that the Mustrim can wash the island from the east and from the west with equal probability. Each chief's preferences reflect the preferences of the whole tribe and are

representable by a utility function with the expected utility form and the Bernoulli utility function of a form $u^k(x^k) = \ln(x^k)$, where $k = A, B$, A - Auri chief, B - Bauri chief. Suppose that before the direction of the Mustrim is known the chiefs can make commitments to receive or deliver certain amounts of coconuts depending on the direction of the current, and when the Mustrim takes a particular direction the chiefs recognize that simultaneously and correctly. Find the equilibrium prices of coconuts on the island for each possible direction of the Mustrim.

c) According to the idea of William Trufant Foster and Waddill Catchings, which is called the paradox of thrift, if households increase their savings, the total amount of private savings in the economy can decrease, or at least stay the same. This idea was supported by a Nobel laureate Paul Krugman, who used the paradox of thrift as one of the most important arguments in favor of increased in government spending after the World financial crisis in 2007-2008.

(i) (5 points) Explain intuitively why an increase in household savings can lead to a decrease in household savings in a closed economy in the short run. Why Paul Krugman may suggest an increase in government spending in this case?

(ii) (5 points) Consider a country with a perfect capital mobility and flexible exchange rate. Will the paradox of thrift hold in such an economy? Explain intuitively.

d) In late 2014 the Bank of Russia switched from maintaining a fixed exchange rate to an inflation targeting regime. A transition to inflation targeting was accompanied by a strong capital outflow and ruble depreciation, however, central bank could not continue to maintain fixed exchange rate and target inflation simultaneously.

(i) (4 points) Explain what benefits country may have from maintaining a fixed exchange rate (you may not use the example of Russian economy). Provide at least two arguments and explain your answer.

(ii) (6 points) Why the Bank of Russia could not continue to maintain a fixed exchange rate and target inflation simultaneously? Give economic arguments and explain your answer carefully.

2. (30 points)

Consider a one-aggregate-consumer, one-producer economy. The consumer chooses how much to spend on consumption in each of the two time periods. The consumer has some nonlabor income M. In the first period he has two alternative uses for his time: work and leisure. The total time allocated to these activities must equal the total time available in the first period $\bar{L}$, such that $\bar{L} = 9M$. Let w denote wage rate (money paid to a worker per unit of time).

On the market there is a single interest rate r (defined as a proportion) for savings and borrowings. In the second period the consumer isn't able to work and has no additional nonlabor income. The consumer's consumption is equal to the amount saved, taking into account the interest paid. Consumer preferences are representable by the utility function $u(c_1, c_2, l) = c_1^{3/8} c_2^{1/4} l^{3/8}$, where c_1 denotes the money value of expenditures on goods in the first period, c_2 denotes the money value of expenditures on goods in the second period, l denotes leisure time in the first period.

The firm production function is given by $C_2 = C_1^{1/2} L^{1/2}$, where C_1 denotes borrowed money at the rate of r, C_2 denotes the money value of goods produced by the firm (the same value in equilibrium is spent by the consumer in the second period), L denotes labor used at the

wage w. The firm in the first period borrows money for use in production and wage payment (which must be paid in the first period). The firm pays the debt with interest in the second period when it sells its products.

a) (5 points) Derive the equation of the budget line. Find the demand function of c_1, c_2, and l.

b) (13 points) Find a Walrasian equilibrium in the economy in question, i.e. find the equilibrium values of the variables r, w, c_1, c_2, l, C_1, C_2, L (with M or $\overline{L}$ as parametr when it is necessary).

c) (12 points) Suppose the government introduces a program to stimulate consumer savings paying in the second period an extra interest rate s (i.e. paying in the second period the amount of money that is equal to the product of s and the amount that the consumer saves). In order to pay incentive payment the government in the first period taxes the consumer's labor income: the consumer pays a proportion $\tau = 1/3$ of labor income to the government. In the first period the government lends the collected money at the rate r. The government expenditures are equal to the government revenues.

Derive the expression for the extra interest rate s so that there is neither budget deficit nor budget surplus. Derive the equation from which the equilibrium wage rate can be found (you don't need to look for it).

Is it possible to state how consumer welfare has changed (got better/worse) in clause (c) compared to clause (b) without calculating all the components of the equilibrium? Explain how welfare has changed if possible. If not, explain what information is missing.

3. (30 points)

The economy is given by the IS-LM model in logarithms:

$$y = c - ai + \varepsilon_{IS} \quad (1)$$

$$m - p = hy - ki + \varepsilon_{LM}, \quad (2)$$

where ε_{IS} and ε_{LM} are the stochastic shocks of the goods and money markets correspondingly. ε_{IS} and ε_{LM} are independent, mean values are equal to zero and variances are given by σ_{IS}^2 and σ_{LM}^2. a, h и k are model parameters with positive values. The central bank does not have a direct control over the money supply. The central bank can only influence it through a narrower monetary aggregate – the monetary base. Therefore, the changes in the money supply are linked with the changes in the monetary base through the following equation:

$$m = b + zi + w_m, \quad (3)$$

where b – monetary base logarithm, w_m – money multiplier stochastic shock, $z > 0$. Mean value of the shock is equal to zero, variance is given by σ_w^2. All shocks in the model are independent. Let us assume for simplicity, that p is fixed.

The central bank's aim is to stabilize output. However, the central bank can observe neither y nor stochastic shocks. The series of actions is the following: first the central bank sets either the interest rate or the monetary base as a monetary policy instrument, then the stochastic shocks are realized and afterwards the values of endogenous variables are determined.

a) (6 points) Explain intuitively the relationship between the money multiplier and the interest rate. Is money supply exogenous or endogenous? Why?

b) (8 points) Assume that the central bank is targeting the interest rate and sets i equal to $\bar{\imath}$. Find the variance of the equilibrium output and draw the IS-LM graph. How does the output variance depend on σ_{IS}^2 and $(\sigma_{LM}^2 + \sigma_w^2)$? Explain intuitively.

c) (8 points) Assume that the central bank is targeting the monetary base and sets b equal to $\bar{b}$. Find the variance of the equilibrium output and draw the IS-LM graph. How does the output variance depend on σ_{IS}^2 and $(\sigma_{LM}^2 + \sigma_w^2)$? Explain intuitively.

d) (2 points) What will the central bank be targeting if (a) the economy is subject to goods market shocks only; (b) the economy is subject to both money market shocks only?

e) (6 points) Assume that there is only goods market shock in the economy. Interpret the parameter z. How does the output variance depend on z? Explain intuitively and illustrate for two different values of z.