

# International Economics Olympiad

Moscow

## Economics

Test

All 20 multiple choice questions will be graded (4 raw points for the correct answer, minus 1 raw point for the incorrect answer, zero points for no answer)

1. What does UK GDP per capita measure?

- 1) the total output of London's economy
- 2) the average disposable income of a UK resident
- 3) the total output of the UK citizens, divided by the number of the citizens
- 4) the total output of the UK's economy, divided by the country's population

2. Currently you work for 40 hours per week at the wage rate of \$20 an hour. Your free hours are defined as the number of hours not spent in work per week, which in this case is  $24 \text{ hours} \times 7 \text{ days} - 40 \text{ hours} = 128 \text{ hours per week}$ . Suppose now that your wage rate has increased by 25%. If you are happy to keep your total weekly income constant, then

- 1) Your total number of working hours per week will fall by 25%
- 2) Your total number of working hours per week will be 30 hours
- 3) Your total number of free hours per week will increase by 25%
- 4) Your total number of free hours per week will increase by 6.25%

3. Four farmers are deciding whether to contribute to the maintenance of an irrigation project. For each farmer, the cost of contributing to the project is \$10. But when any one farmer contributes, all four of them will benefit from an increase in their crop yields, in particular each gains additional \$8.

Which of the following statements is correct?

- 1) If all the farmers are selfish, none of them will contribute
- 2) There are multiple Nash equilibria in this game
- 3) If Kim is altruistic and contributes \$10, the others might contribute too, even if they are selfish
- 4) If the farmers have to reconsider this decision every year and consider infinite horizon of planning, they will never choose to contribute to the project if they are selfish

4. Which of the following statements about the outcome of an economic interaction is correct?

- 1) If the allocation is Pareto-efficient, then you cannot make anyone better off without making someone else worse off

2) All participants are happy with what they get if the allocation is Pareto efficient

3) There cannot be more than one Pareto-efficient outcome

4) Pareto-efficient outcome is always fair

5. Maria earns \$12 per hour in her current job and works 35 hours a week. Her disutility of effort is equivalent to a cost of \$2 per hour of work. If she loses her job, she will receive unemployment benefit equivalent to \$6 per hour. Additionally, being unemployed has psychological and social costs equivalent to \$1 per hour. Then

1) The employment rent per hour is \$3

2) Maria's reservation wage is \$6 per hour

3) If she is offered a job with the wage \$11 and disutility of \$0.5, she will refuse

4) If she is offered a job with the wage \$14 and disutility of \$3, she will take it

6. The table represents market demand  $Q$  for a good at different prices  $P$

Q	100	200	300	400	500	600	700	800	900	1,000
P	\$270	\$240	\$210	\$180	\$150	\$120	\$90	\$60	\$30	\$0

The firm's unit cost of production is \$60. Based on this information, which of the following is correct?

1) At  $Q = 100$ , the firm's profit is \$20,000

2) The profit-maximizing output is  $Q = 400$

3) The maximum profit that can be attained is \$50,000

4) The firm will make a loss at all outputs of 800 and above

7. Which of the following statements is correct?

1) A fall in the mortgage interest rate would shift down the demand curve for new houses

2) The launch of a new Samsung smartphone would shift up the demand curve for existing iPhones

3) A fall in the oil price would shift up the demand curve for oil

4) A fall in the oil price would shift down the supply curve for plastics

8. Which of these measures will by itself decrease the Gini coefficient of income distribution?

1) Flat rate income tax

2) Regressive income tax

3) Progressive income tax

4) Income tax at the rate of 80% for the richer half of the population and income tax at the rate of 20% for the poorer half

9. Which of the following statements is correct?

1) The fundamental value of the shares in a firm is determined by expected future profits and systematic risk

2) If there is no new information regarding the future profitability or systematic risk of a firm, but its share price keeps rising, the fundamental value must be increasing

3) Buying a share at a price above its fundamental value in the hope that someone else would buy it from you at an even higher price is guaranteed to lose money

4) All investors always agree on the fundamental value of the shares in a firm

10. Consider the situation where the noise of a factory's production affects nurses in the dormitory next door. If there are no transaction costs to impede bargaining, which of the following statements is correct?

1) Whether the final output level will be Pareto efficient depends on who has the initial property rights

2) The nurses would be better off in the bargained allocation if they initially had a right to undisturbed sleep than they would if the factory has the right to make noise

3) If the factory has the right to make noise, it will prefer not to bargain with the nurses

4) If the nurses have the initial rights, they will obtain all of the net social gain from factory production

11. Which of the following statements is correct?

1) GDP can be measured either as the total spending on domestically produced goods and services, or the total value added in domestic production, or the sum of all incomes received from domestic production

2) Both exports and imports are included in the measurement of GDP

3) Government production is not included in the GDP

4) Domestically consumed goods are included in GDP with more weight than exports

12. Which of the following statements is correct?

1) Maintaining fiscal balance in a recession helps to stabilize the economy

2) Automatic stabilizers refer to the fact that economic shocks are partly offset by households smoothing their consumption in the face of variable income

3) The multiplier on a fiscal stimulus is higher when the economy is functioning at full capacity

4) A fiscal stimulus can be implemented by raising spending to directly increase demand, or by cutting taxes to increase private sector demand

13. Which of the following statements is correct?

1) When interest rates go down, asset prices go up

2) The zero lower bound refers to the central bank's inability to set the real interest rate to below zero

3) Quantitative easing involves the central bank lowering its official interest rate

4) Interest rates cannot be set in a currency union

14. Which of the following statements is correct?

1) In the short-run model the amount of some factor is fixed, while in the long-run model the amount of this factor can vary

2) Labour-saving technological progress raises unemployment in both the short and long run

3) Firms are more likely to enter the market when the markup is low

4) The markup is independent of the number of firms

15. Which of the following statements is correct, *ceteris paribus*?

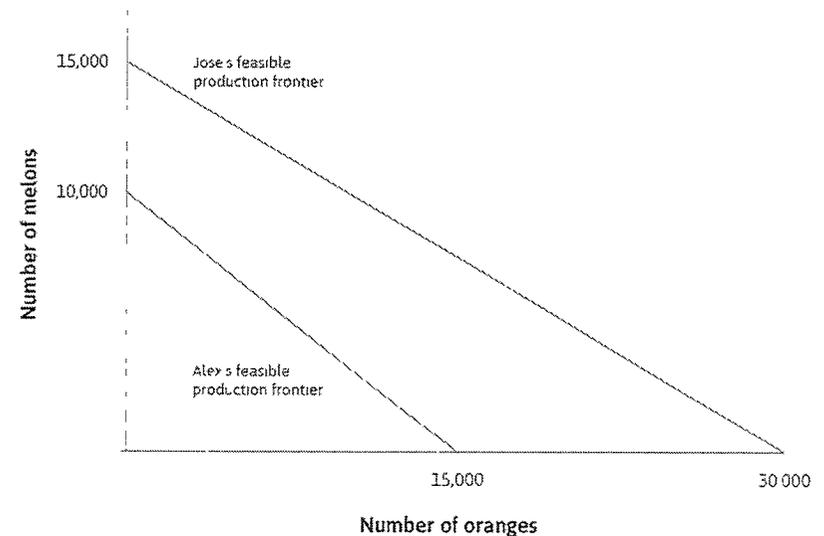
1) An increase in the trade surplus would lead to a decrease in a country's current account

2) A country with zero trade balance but historically high foreign direct investment would always have a current account deficit

3) An increase in remittances by a country's nationals abroad would lead to a lower current account

4) An increase in the official aid payment sent to other countries means a lower current account

16. The following diagram shows Alex's and Jose's feasible production frontiers for oranges and melons (Resource allocation is equal between them)



1) Jose has an absolute advantage in the production of melons but not oranges

2) Jose has a comparative advantage in the production of melons

3) With trade and specialization, Jose will specialize in the production of oranges while Alex will specialize in the production of melons

4) The relative price of melons after trade will be 1.75

17. Which of the following statements is correct?

1) Lump-sum taxes equal for all citizens decrease inequality

2) Providing high-quality education to citizens is a way of raising the endowments of less well off people

3) An increase in the minimum wage increases unemployment, leading to higher inequality unambiguously

4) Non-complete contracts mean that workers can demand higher wages, leading to reduced inequality

18. Which of the following statements is correct?

1) Bargaining between affected parties is always effective in reducing the inefficiencies caused by externalities, even in the presence of transaction costs

2) The market price of pesticides is unlikely to reflect the full social cost of their use

3) All externalities result in the good producing the external effect being overused

4) Reducing air travel is an unfortunate and inefficient by-product of taxing flights

19. Which of the following statements is correct?

1) There is no innovation in the absence of patents

2) Longer patent duration will always lead to an increase in the probability of innovation

3) There is trade-off between greater incentive to innovate from higher innovation rent income and the disincentive for potential innovators from using patented knowledge

4) The optimal duration of patents is where the probability of innovation is maximized

20. Which of the following cases represents the concept of a *natural experiment*?

1) People play Ultimatum game differently in different experimental setups

2) The placebo effect of a drug was confirmed in the laboratory

3) The difference between the economies of South and North Korea

4) People sometimes cooperate in the Prisoner's dilemma game conducted for writing papers in experimental economics

### Problem 1. "True cost?"

(30 raw points)

In Moscow, there exists a restaurant chain that uses the following pricing mechanism

A consumer must pay some entrance fee, after that they can order whatever they want for the price that is equal to the cost of ingredients. The price of an entry ticket depends on the time of the day (being higher in the evening than in the morning), but prices of menu items remain the same and are very low for Moscow standards

For instance, a portion of pasta costs only about \$2–2.5, the price of a ribeye steak is about \$4, a burger with grilled tiger prawns and arugula can be purchased for merely \$3. For only \$3–4 a customer can drink a glass of decent wine. These prices are very low compared to other restaurants in the city. Customers must eat and drink inside, if they want to take something away, the price doubles.

a) (15 rp) One of the well-known models of price discrimination explains how similar pricing scheme can be profitable for a seller (for instance, in Disneyland entrance fee is high while using most of its facilities is free). Using this model, explain, how such pricing technique helps this restaurant maximize profits (use graphical analysis where appropriate)

b) (15 rp) While such a scheme is successful in the theme park industry and restaurant business, we don't see supermarkets or clothes shops pricing this way. Explain why.

### Solution

a) Two things are important here

1. **Different entry fees for different times of the day** This works because in the evening and at night people are ready to pay more in restaurants. This is because they most likely want to have a fancy dinner with wine etc. rather than a small breakfast that they can otherwise (if prices are high) cook at home. Similar things are sometimes called a *third-degree price discrimination*.

2. **Entry fee by itself** This pricing is sometimes called two-part tariff (second-degree price discrimination) and the logic behind it is as follows. If the restaurant use a simple linear price (that is, some fixed amount per meal without any other fees), he has a dilemma. If the price is way higher than marginal cost, profit per meal will be high, but the restaurant will undersell, thus leaving some potential profit unreceived. On the other hand, low linear prices close to the marginal cost will allow to sell many meals, but each meal will bring little profit, leaving the surplus to the customers.

Two-part tariff is a solution. Thus the restaurant can make prices of single meals low (close or equal to marginal cost) and make consumers buy more of them. Simultaneously, the restaurant can remove the surplus from the customers via entry fee. Effectively, the more meals a consumer buys in the restaurant, the cheaper they become on average (because of the fixed entry fee).

b) The crucial feature of the restaurant is that a customer must consume meals that he ordered *inside*. Note that if a customer wants to take something away, the price doubles — this was sort of a hint in the question. In a supermarket or a clothes store consumers would cooperate to pay entry fee only once and buy a lot of stuff. In a restaurant where you have to eat inside it is impossible.

**Points distribution**

- a) 5 Different entry fees explained
- a) 10 Entry fee explained
- b) 15 Answer is clear and fully covers the question

**Problem 2. "Substitutes and complements"***(30 raw points)*

Consider two commodities, A and B, that are substitutes in consumption

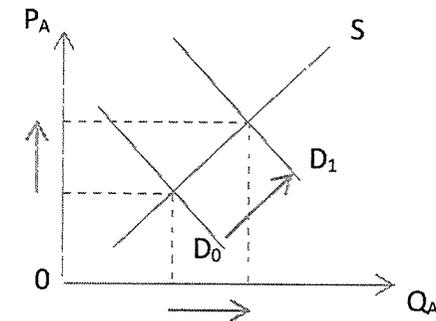
a) (10 pr) Suppose that the number of consumers of good A increased, thus shifting the demand for it. Assuming perfect competition in both markets, what can you say about the resulting change in the price of B? Explain in detail.

b) (10 pr) Suppose that A and B are not only substitutes in consumption but also complements in production. What can you say about the resulting change in the price of B? Explain in detail.

c) (10 pr) Give a real-world example of two commodities that are both substitutes in consumption and complements in production.

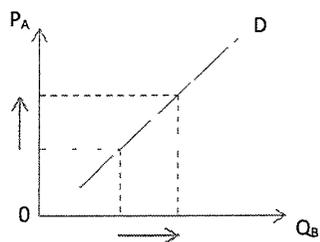
*Solution*

a) If number of customers for good A increases, this means that demand for good A will increase and demand curve will shift to the right thus increasing price and quantity demanded for product A (see Pic 1)



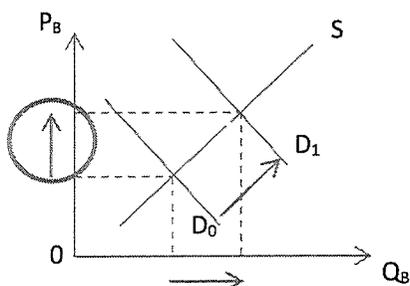
Pic 1 Demand for product A

Growing demand for product A will increase the pressure on the price of the product A, thus causing consumers reconsider the choice of product A and switching to substitute product B (see Pic 2)



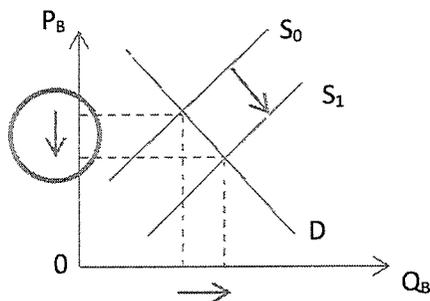
Pic 2 Substitute products A and B (case of cross-price)

If customers are switching to product B then this puts also a pressure on the price of product B. Price of product B increases.



Pic 3 Demand for product B

b) If goods A and B are also complements in production, increase of quantity supplied of A will increase also the supply of B thus causing the downward pressure on the price of B (see Pic 4)



Pic 4 Demand for product B

Combining Pics 3 and 4, we infer that the effect on the price of B is unclear

c) Complements in production are two or more goods that are jointly produced using a given resource. The production of one good automatically triggers the production of another, often as a by-product. Both goods are simultaneously produced from the same resources. Production of one good does not decrease the production of the other, as would be the case for substitutes in production.

Real-life examples

- 1 Oil and Gas
- 2 Chicken wings and chicken breast
- 3 Milk and yogurt

**Points distribution for all parts**

- 0 No significant answer or answer that doesn't fit the question
- 5 Partial answer. Answer fits the question, but some parts are not explained well or unclear
- 10 Full answer. Answer is clear and fully covers the question

**Problem 3. “Letting the Briber Go Free”***(30 raw points)*

A situation where a government official uses his position to acquire illicit benefit is called corruption. Corruption is a big problem in many countries and governments design different policies to curb it. According to one of the proposed policies (sometimes called *the Basu proposal*<sup>1</sup>), the government should make it legal to give bribes and severely punish only bribe-takers.

- a) (10 rp) Explain the logic behind this proposal. Why may it work?
- b) (10 rp) Suppose Alice and Beatrice are trying to pass a test to get the driver’s licenses. Alice is a good driver. However, Beatrice is a hazard to other drivers and is about to fail the test. The examiner is corrupt and tries to maximize his revenue from bribes. How will implementing the Basu proposal affect Alice and Beatrice?
- c) (10 rp) Generalise the example above. For what *class of bribes* the Basu proposal can be an efficient policy?

*Solution*

a) The mechanism of asymmetric punishments creates incentives for the bribe-giver to report the facts of corruption (blow the whistle), and so, by backward induction, reduces official’s incentives to take bribes.

It is not enough to say that increasing the fine for corrupt officials decreases their incentives to ask for bribes. There is nothing special about increasing fines (why not increase fines for both sides?), Basu proposal is special because it encourages whistle-blowing.

b) If the examiner is corrupt, he will try to receive bribes from both ladies, but these are different types of bribes.

In the case of Alice, what official does is called *extortion* (*mzdoimstvo* in Russian) – he tries to receive bribe for performing legal actions that are supposed to be free of charge. In this case, implementing the Basu proposal will create perfect incentives for Alice to blow the whistle, but probably the official will expect that so implementation is likely to reduce corruption.

Things are different for Beatrice. In her case, the examiner will try to receive the bribe for something he is not supposed to do at all (issuing the licence for a person who cannot drive) – in Russian it is called *lihoimstvo*<sup>2</sup>. Of course, if Beatrice rats the examiner out after Basu proposal implementation, she will receive her bribe back but will also have to return her driver’s licence because it was issued illegally. But why apply for the licence in the first place? It was a voluntary, mutually beneficial transaction between her and the examiner (although producing negative externalities for society), so cancelling it will make her worse off. Thus, implementing Basu proposal in the case of Beatrice won’t be effective.

c) The answer follows from b) Basu proposal can be an efficient policy only for those cases of corruption when the official tries to extort money for doing his official job.

<sup>1</sup>See Basu, K. (2011) *Why for a Class of Bribes, the Act of Giving a Bribe should be Treated as Legal*

<sup>2</sup>For more about the difference between *mzdoimstvo* and *lihoimstvo*, see Bardhan, P. (1997) *Corruption and development: a review of issues* *Journal of economic literature*, 35(3), 1320-1346. Bardhan actually uses these Russian words to describe different types of corruption.

**Points distribution for all parts**

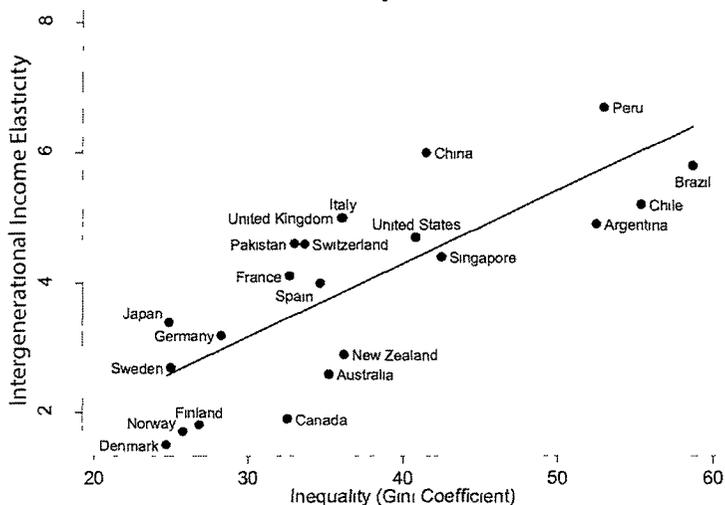
- 0 No significant answer or answer that doesn’t fit the question
- 5 Partial answer. Answer fits the question, but some parts are not explained well or unclear. For example, if in part a) the contestant only says that increasing the fine for the official will create a disincentive to extort bribes.
- 10 Full answer. Answer is clear and fully covers the question.

**Problem 4. “Intergenerational Elasticity”** (30 raw points)

The degree to which members of society have equal opportunity of success, irrespective of their family background, is often measured by *intergenerational elasticity of income*. Roughly, it measures what percentage of inequality between members of the generation is passed on to the members of the next generation. Here is a definition from *The Economy* by CORE

[C]onsider two pairs of fathers and children. The father in the first pair is richer than the father in the second. The intergenerational elasticity measures how much richer the child of the well off father will be than the child of the poorer father. An elasticity of 0.5, for example, means that if one father is 10% richer, then his child, when grown up, will be on average 5% richer than the other child.

The following graph shows the relation between inequality and intergenerational income elasticity. Sometimes it is called *The Great Gatsby Curve*<sup>3</sup>



Corak, M (2012) *Inequality from generation to generation: The United States in comparison*

Provide two distinct economic arguments that explain the positive correlation between current inequality (measured by the Gini coefficient) and intergenerational inequality.

**Solution**

In grading we valued clarity of the exposition and well connected arguments. We took into consideration that the statement of the question does not specify whether the Gini coefficient refers to pre- or post-tax income.

In the answer, students should address two arguments in line with those presented in the following list:

- Ability: more able parents have higher income and transmit their ability to their kids (when income represents labor productivity)
- Inheritance: higher income parents accumulate more wealth and their children receive a higher inheritance (income from wealth)
- Arguments related to imperfections
  - Children from higher income parents enjoy better opportunities to increase their income via access to education, parental care,
  - Children from higher income families do not suffer from credit constraints
  - Segregation and discrimination
  - Inequality leads to institution failures: favoritism in the labor market, corruption

**Point Distribution**

- 5 points: Descriptive answer
- 10 points: Some argumentation but not fully developed
- 15 points: One sound reason
- 20 points: One sound reason with a second reason not fully developed
- 25 points: Two reasons with some gaps in the argumentation
- 30 points: Two distinct sounded reasons

<sup>3</sup>The term is attributed to Alan Krueger

**Problem 5. "Current Account Deficit"***(30 raw points)*

During his lecture at Sberbank Corporate University, Ilya Androsov was talking about countries that find themselves in a situation of current account deficit

a) (15 *rp*) Using the example of Turkey, explain why this deficit can be detrimental to economic growth

b) (15 *rp*) Can you tell a story where such current account deficit can be beneficial for the economy of the country?

**Solution**

a) Ideal answer current account deficit is balanced by an inflow of foreign capital. It means that the country is borrowing abroad. To establish if this borrowing is good or not, one needs to look at the use of the credit and the terms of credit.

Turkish banks were borrowing in foreign currencies (dollar and euro-denominated bonds and loans), which means that they were exposed to the currency risk. They tried to address this exposure by extending loans to their customers in dollars as well, but that only transferred the exchange-rate risk exposure off their balance sheets and to the balance sheets of their customers. In the end, banks were still exposed to the exchange rate risk through default risk of their customers. Moreover, the loans extended were of short maturity. All this means that the terms of the credit that Turkey got were unfavorable (short credit with exchange-rate exposure).

Turkey used the credit to finance its construction boom. Despite part of the money going to the construction of infrastructure, there was also a substantial fraction that financed construction of residential and commercial real estate that had little potential to increase the country's GDP in the future. From the lecture we learned that investment projects were of poor quality as lending standard deteriorated, also bringing into question the ability of such projects to boost GDP growth. Hence, the way Turkey spend this borrowed money was not generating GDP growth.

**Grading** (mention one of each)

**5pts** Unstable currency. Currency exposure of banks through borrowing in USD, but lending in lira.

Substantial leverage and accumulated interest expense.

**10pts** Mismatch between maturity of loans and investments. Rollover risk.

Currency exposure of banks through default risk of loans. Deterioration of credit standards.

**15pts** Investments in construction projects, residential and commercial i.e. boosting consumption.

b) Ideal answer

If the international loans are done at good terms and the funds are invested wisely, then current account deficit can be beneficial for a country. Example of good loan terms - USA, that is able to borrow in \$, its domestic currency. Hence, its counter-parties are exposed to the exchange rate risk, not the USA.

If a country, on top of that, is using borrowed funds not for consumption, but for invest-

ment goods, then its GDP growth is likely to accelerate in the future.

Quoted from one of the submitted answers "Imagine a scenario in which lots of companies in a country with lots of sunshine decided to stop their activities and start a joint venture in which with funds or loans partly from abroad they made a huge system that got energy from the sun (solar panels, etc) and produced enough energy not only for the country but also for the surrounding ones. This way, the current account would be in deficit for several years but when the country started being fueled by green energy, energetically efficient and sold energy to these countries not only would the current amount deficit be greatly reduced but also lots of economic activities surrounding the energy sector would develop, thus boosting the country's economic activity."

**Grading.** (mention one of each)

**5pts** Stable currency

Investment in education by foreign aid agencies

**10pts** Loans in domestic currency. Example: USA. Long-term credit

**15pts** Investments in production capacity, not consumption