

2018/2019 IEO Economics 单选题知识点对比

	2018	2019
1	人均 GDP	计算 discount
2	计算题(收入和工作时间)	PPC 有关计算
3	Nash equilibrium	列式计算: 指数函数
4	Pareto 问题	列式计算
5	边际的应用	特殊概念: commitment device
6	成本的概念和计算	经济学家和理论 intuitional theory
7	供需关系	供需关系和价格上下限
8	收入分配, Gini Ratio 与税收	自然垄断
9	股票决定因素	完全竞争
10	Pareto 问题	利率计算
11	GDP	利润最大化
12	Fiscal Policy	经济大萧条
13	Monetary Policy	价格歧视
14	成本的概念	偏见理论
15	国际收支平衡表	流动性陷阱
16	相对优势	国际收支平衡表
17	收入分配均衡	收入分配, Gini Ratio 与税收
18	外部性和科斯定律	规模经济与外部性
19	选择	投资风险
20	特殊概念 natural experiment	财政政策和货币政策

2019 年国际经济学奥林匹克竞赛

International Economics Olympiad

经济学测评 Economics

~**真题** Problems~



Multiple Choice Test

All 20 multiple choice questions will be graded (4 raw points for the correct answer, -1 raw point for the incorrect answer, 0 points for no answer). Choose one answer in each question.

1. The local grocery store offers a discount of 20% if a customer pays the 10 USD monthly fee. How much should a customer's monthly spending in this store be so that paying this fee makes sense for her?

- 1) At least 10 USD 2) At least 30 USD ☒ 3) At least 50 USD 4) At least 60 USD

2. Countries A, B and C produce only watermelons (X) and grapefruits (Y). The production possibility frontiers are given by: $X_A + Y_A = 100$, $2X_B + 3Y_B = 300$, $X_C + 2Y_C = 600$. What is the maximum amount of watermelons that they can produce together if they want to produce at least 200 grapefruits?

- 1) 200 2) 500 ☒ 3) 600 4) None of the above

3. GDP of the country X grows by 1% per year every year. GDP of the country Y grows by 2% per year every year. If in the year 2019 countries have equal GDP, by what year will their GDP differ by two times? (Choose the nearest estimate).

- 1) 2050 ☒ 2) 2090 3) 2150 4) 2180

4. Jane spends all her money on the ingredients of her favorite cocktail. To make a portion of the cocktail, she has to mix 200 ml of orange juice with 100 ml of apple juice and with 200 ml of water. Any juice costs 3 USD per liter, water costs 0.5 USD per liter. If she has 20 USD, how many portions of the cocktail can she make?

- 1) 10 2) 12 ☒ 3) 20 4) None of the above

5. Which of the following statements best describes the concept of *commitment device*?

- ☒ 1) A student announces through social media that he will contribute to charity every time he gets a grade lower than B- and publish the receipts online.
2) A country leader announces the new policy of fighting corruption through increased fines for corrupt officials.
3) An investor buys treasury bonds.
4) The price of ice-creams increases after a surge in demand.

6. Which of the following scholars represents the modern institutional theory of economic growth?

- ☐ 1) Daron Acemoglu ☐ 2) Jared Diamond ☐ 3) Thomas Malthus ☐ 4) Adam Smith

7. The demand for widgets is given by $Q = 100 - 2P$, the supply is given by $Q = -20 + P$. The government sets the price ceiling at $\bar{P}$ which results in the deficit 30. Find $\bar{P}$.

- ☐ 1) $\bar{P} = 10$ ☐ 2) $\bar{P} = 20$ ☒ 3) $\bar{P} = 30$ ☐ 4) $\bar{P} = 40$

8. Which of the following best describes *natural monopoly*?

- ☐ 1) An eco-friendly monopoly.
☒ 2) A firm that can produce at lower average costs than two or more firms.
☐ 3) A monopoly on the agricultural market.
☐ 4) A monopoly that was created without government intervention.

9. Consider a perfectly competitive market where all firms have constant and equal average cost (a *constant cost industry*). How will an increase in demand affect the long run equilibrium price on such a market?

- ☐ 1) Price will increase ☒ 2) The price will remain constant
☐ 3) The price will decrease ☐ 4) Unclear

10. You are going to buy a laptop for 1,000 USD. You can either withdraw this money from your bank account (it pays 10% interest yearly) or do it using one of the following credit schemes. Pick the scheme in which you will spend the most amount of money overall.

- ☐ 1) Paying directly from you bank account.
☒ 2) Credit at 0.1% compound interest per day, the only payment is at the end of the year.
☐ 3) Credit at 12% interest rate per year, the only payment is at the end of the year.
☐ 4) Credit at 0.5% compound interest per month, the only payment is at the end of the year.

11. A perfectly competitive market has 100 firms, each of which has constant $MC = 10$. The demand function is given by $Q = 100 - P$. How much will the market price increase if all firms create a cartel and maximize joint profit?

- ☐ 1) By 15 ☐ 2) By 35 ☒ 3) By 45 ☐ 4) By 50

12. Which of the following happened at the beginning on the 21st century?

- ☐ 1) The Great Depression ☒ 2) The Great Recession
☐ 3) The First Industrial Revolution ☐ 4) Collapse of the gold standard

13. Firm S is a monopolist on the market for space tourism. The demand for its service is discrete: consumers are eager to pay 12M USD for the first trip, 11M USD for the second trip, etc., up to 1M USD for the 12th trip. To organize a trip, the firm must spend 4M USD. What is the difference between the maximum profit that the firm S can obtain with the perfect price discrimination compared to linear pricing?

- 1) 10M ☒ 2) 16M 3) 20M 4) None of the above

14. You can often hear the success stories of investors who earn a lot of money at the stock market. At the same time, the stories of many failures remain untold. This can create a wrong impression that investing in the stock market is always profitable. This logical fallacy is called...

- ☒ 1) Survivorship bias 2) Confirmation bias
3) Self-fulfilling prophecy 4) Endowment effect

15. Which of the following best describes the concept of *liquidity trap*?

- 1) A person cannot withdraw money from his bank account because of the bank's bankruptcy.
2) A firm wants to invest money earned but cannot find projects worth investing in.
3) A government has so much debt that it has to default.
☒ 4) The interest rate is so low that people prefer holding cash.

16. Which of the following best describes the concept of *negative trade balance*?

- ☒ 1) A country buys from abroad more than it sells abroad.
2) A country buys from abroad less than it sells abroad.
3) A country's GDP declines for more than three quarters.
4) A country's FDI declines for more than three quarters.

17. Which of the following policies will most likely reduce the Gini coefficient?

- ☒ 1) Progressive income tax. 2) Regressive income tax.
3) Fixed rate income tax. 4) None of the above.

18. Which of the following statements best describes the concept of *network externality*?

- 1) The service is provided on-line.
2) Producer uses multilevel marketing to attract new customers.
☒ 3) The individual utility of using a service increases with the total number of users.
4) The marginal tax rate increases with an increase of income.

19. Which of the following instruments is typically the riskiest one?

- 1) U.S. Treasury bills
- 2) Common stocks of a company from S&P 500
- 3) Deposit in a commercial bank
- ☒ 4) Shares of a startup in Silicon Valley

20. Choose the government policy that will by itself reduce short-run GDP (use the AD-AS model).

- | | |
|---|-------------------------------------|
| ☒ 1) Increase in the sales tax rate | 2) Decrease in the income tax rate |
| 3) Quantitative easing | 4) Buying assets on the open market |



Open Questions

Solve no more than 4 questions out of 5. Indicate your choice of questions to grade on page 3 of your paper.

If you provide solutions for all 5 questions, all of them will be commented by the Jury, but only 4 will add to your score. In this case, if you do not specify which to grade, the maximum grade of 5 will be excluded.

Every open question is worth 30 raw points.

If not stated otherwise, think of all goods, services and assets as of infinitely divisible. Numbers of firms and people may be only integer.

Convey your ideas clearly. Don't skip important logical transitions in your reasoning. Take care of handwriting. If you strike something out, it won't be graded.

If you want to leave the room for a while, raise your hand and ask a volunteer.

Good luck!

Question 1. “Mechanism Design”

(30 raw points)

There are three kids: Alice, Bob and Clara. Their mother wants to split a cake of size 1 into three pieces and distribute them among the kids. Every kid wants to eat as much cake as possible.

a) (10 rp) Consider the following mechanism. Alice cuts the cake in three pieces the way she likes; then Bob takes any piece he likes, and then Clara takes any piece she likes (of the two that are left), so Alice is left with another remaining piece. How will Alice cut the cake?

b) (20 rp) Now consider a more complicated situation. A kid is *unhappy* if he or she gets less than a certain share of a cake. In particular, Alice will be happy if she gets at least a piece of size a , Bob needs at least b , Clara needs at least c . For every kid, getting a piece of the minimum required size is better than getting no cake, which is, in turn, better than getting a piece of less than the minimum required size. If one is already happy, he or she nevertheless prefer getting more cake to less cake. The mother knows that $0 < a, b, c < 1$ but does not know a, b or c . All three children know all three numbers. Under which a, b, c does a mechanism that ensures each of the kids is happy exist? Suggest such a mechanism.

Solution

a) She should divide the cake in 3 equal parts. Otherwise, her sibling will take the larger pieces and she will be left with the smallest one.

b) Such mechanism cannot exist if $a + b + c > 1$. In this case, the cake is too small to make everyone happy. We will show that the mechanism exists for any a, b, c such that $a + b + c \leq 1$.

For example, the following mechanism can be applied. Alice offers some distribution of the cake to her siblings. Each of the siblings then votes in favour or against this distribution. If both votes are in favour, the distribution is accepted. Otherwise, no one gets anything.

In such a mechanism, Alice has an incentive to offer the distribution that makes both siblings and herself happy (which is always possible as long as $a + b + c \leq 1$). Bob and Clara have incentives to accept such distribution because they will get nothing otherwise. Should Alice offer any distribution which makes Bob or Clara unhappy, the unhappy sibling(s) will vote against because they prefer to get nothing.

The crucial features of any proposed mechanism are the following:

1. The distribution of a cake among the kids must be done one of them (because the mother is unaware of a, b, c values).
2. If suggested distribution doesn't satisfy kids' minimal requirements, everyone gets nothing.

Marking Scheme.

a) Right answer and correct explanation – 10 rp; only right answer – 5 rp.

b) Correct mechanism is developed (both necessary features are satisfied) with complete explanation why it works, the right answer is provided and necessity of constraint is explained – 20 rp, if solution is given without explanation of the necessity of the constraint – 15 rp.

Correct mechanism is developed with complete explanation why it works, but only fea-

ture 2 is indicated, a right answer is provided and necessity of constraint is explained – 15 rp.; without answer or without explanation of the necessity of the constraint – 10 rp.

Correct mechanism is developed (both necessary features are indicated), but is not explained why it works, a right answer is provided and necessity of constraint is explained – 10 rp. If only one necessary feature is indicated, explanation is absent or a right answer is not provided or explanation of the necessity of the constraint is absent – 5 rp.

No correct mechanism is developed, only necessary constraint is revealed and is explained – 2 rp.; without explanation – 0 rp.

Question 2. “Altomation”

(30 raw points)

The economic growth of the last 150 years has been largely driven by automation – new technologies that allowed mechanization of routine tasks previously performed by labor. The steam engine, electricity, computer chips – all these technologies both contributed significantly to economic growth *and* destroyed jobs.

The most recent wave of automation – the rise of Artificial Intelligence (AI) – seems to be able to automate not only low-skill, physical tasks but also non-routine, cognitive tasks such as driving cars and making medical recommendations. This seems to spur widespread anxiety that artificial intelligence may create mass unemployment in the decades to come. In this task, you are asked to comment on these developments from an economic standpoint.

a) (10 rp) Consider the following simple model. Suppose in a certain industry (say, textiles) the quantity produced (Q) is equal to the degree of automation (A) times the number of workers (L): $Q = AL$. The industry is competitive. The wage is fixed at the level w . The demand for textiles is equal to $D(p)$ where p is price, and D is a decreasing function. Economic equilibrium occurs at a price p such that demand equals supply. Suppose the degree of automation (A) grows so that now the industry needs fewer workers to produce a given amount of textiles. Will the *equilibrium* number of workers employed by the industry necessarily fall as a result? Provide a verbal explanation of the insight you get from the model.

In the following parts, do not limit your argumentation to the model above.

b) (10 rp) A number of authors note that the growth of economic output due to AI and automation will lead to an increase in aggregate incomes, and thus demand, including the demand for new goods and services that are now barely imagined. All this will create new jobs and thus alleviate the problem of unemployment. Criticize this argument.

c) (10 rp) Many people think that publicly financed Universal Basic Income (UBI)¹ is a good solution to the problem of mass joblessness. Identify and address the main problems with the UBI in terms of financing the system and motivation to work (one of each).

Solution

a) The supply will grow, which will increase the equilibrium quantity demanded due to *price effect* which will counter the *productivity effect*. This might increase the demand for labor and employment (due to sticky wages). Mathematically, one gets

$$L(A) = \frac{D(w/A)}{A}.$$

The increasing denominator is the productivity effect, while the increasing numerator is the price effect. When the price effect is larger than the productivity effect, L will increase in A . This happens when demand price elasticity is sufficiently large. Mathematically, one may show that the elasticity should be larger than one.

b) New goods and services might be in the other fields – different from the fields where AI created unemployment. If new goods and services are AI intensive, the growth of employment might be limited. Here we can talk about Structural unemployment which can be solved

¹UBI is a periodic cash payment delivered to all on an individual basis without means test or work requirement.

in the long-run through training and education. The aspect of low-skilled and high skilled labor should be addressed, since AI is taking over low-skilled jobs and creating high-skilled jobs (partially solving created unemployment).

c) Universal Basic Income. Student should look at this concept in complex approach and not just concentrating on the questions asked (very narrow approach).

Universal Basic Income is a concept where students have to keep in mind the positive aspects of the concept:

- Universal Basic Income (UBI) reduces poverty and income inequality, and improves health
- UBI leads to positive job growth and lower school dropout rates
- UBI guarantees income for non-working parents and caregivers, thus empowering important unpaid roles, especially for women.

1) How to finance the UBI system. On one hand, UBI should go to the consumption, thus increasing firms' revenues and generating more income tax and more Government income (there are several strong argument against this assumption). At the same time, research shows that even small size UBI will be expensive for the governments that would just increase a government debt. The issue of taxes should be addressed in this question (Laffer curve).

2) Motivation to work. UBI removes the incentive to work, adversely affecting the economy and leading to a labor and skills shortage. At the same time (not to generalize the answer) student should address how the size of UBI would leave a motivational effect on different income level labor.

Marking Scheme.

Marking scheme for every part:

- **0 points** — no answer or answer with almost no argumentation.
- **5 points** — partial answer — most of the answer is correct and make sense, but missing some aspects, that doesn't fully explain the point of view.
- **10 points** — full answer that is well argued and is logical.

All parts are not limited to only these suggested answers. Points will be awarded if students apply other arguments and they make sense.

Question 3. “Fighting drugs”

(30 raw points)

Chicago is one of the largest cities in the United States with an estimated population of 2.7 million. Located on the shores of freshwater Lake Michigan, Chicago is an international hub for finance, culture, commerce, industry, technology, and transportation. The University of Chicago boasts one of the best economics departments in the world, with at least 30 Nobel Prize winners affiliated with the department. Unfortunately, the city of Chicago has had a serious problem with drug (narcotic) consumption and drug trafficking.

In 2012 alone, there were more homicides in Chicago than in any other metropolis in the United States — a total of over 500, most of which linked to gang violence. According to reports in 2013, “most of Chicago’s violent crime comes from gangs trying to maintain control of drug-selling territories”, and is likely related to the activities of the Sinaloa Cartel, one of the most powerful Mexican drug cartels, which by 2006 sought to control illicit drug distribution.

Chicago’s reputation of a drug trafficking city costs it billions of dollars every year in lost consumption, investment, and unnecessary spending. Chicago public policy officials aspire to reduce drug consumption as it produces negative externalities, which harm the society as a whole, not just the drug addicts.

a) (10 rp) Name at least four negative externalities of drug consumption. Be specific and discuss how, and to what extent, they harm society. Can you think of any positive externalities of drug consumption? Elaborate.

b) (10 rp) Officials have the choice of punishing drug dealers (supply side), drug users (demand side), both or neither, with different levels of severity. Why might you want to target the supply side (drug dealers) as against the demand side (drug users)? Why might you want to target the demand side (drug users) as against the supply side (drug dealers)? Give at least three examples of each. Based on your understanding of the drug-related issues, what problems do you foresee with implementing both policies?

c) (10 rp) Design a specific public policy that you think would be best in reducing drug consumption in Chicago. Bear in mind the specific issues of drug-related problems, for example (1) the fact that drugs are addictive; 2) drug production is illegal in most countries; 3) selling drugs is often connected with violence and other types of crime.

Solution

a) An externality is the cost or benefit that affects a third party, so one who did not choose to incur that cost or benefit. Drugs in the question concerned

The answer was thoroughly insightful and clearly and unambiguously shows that the author deeply understands the problem. The answer contains n The answer is written concisely and clearly, avoid wordiness and . (This does not mean that grammar mistakes have an impact on) The answer contains no factual errors of significance.

Correct answers include, but are not limited to, the healthcare costs that sick drug addicts incur on the public healthcare system in countries where such system exists,

Internalities such as deteriorating health of drug users or diminished income of drug addicts are not externalities and won’t be considered. Similarly, the reasons why drugs are

bad for society is not the same as Also note that the question concerned drug consumption, not drug production.

b) The supply-side is more elastic to punishment. Therefore, measures targeted at reducing supply could be more effective. The demand side is relatively less elastic because drugs are addictive. Measures targeted at decreasing demand could be less effective. To get a full score any discussion about relative elasticities is essential. Problems related to any measure should involve a discussion about externalities. For instance, if the demand or supply of drugs is targeted and as result “price” of drugs increase, the amount consumed is unlikely to decrease (inelastic demand) therefore addicts may do more related crimes to keep consumption levels constant. Hence, any discussion about externalities is important. The argument related to the heterogeneity of levels of addiction users (different elasticities of demand depending on the type of agent) will get additional credit. We require economic reasoning and fully fleshed out arguments behind answers. We care more about the chain of economic reasoning than the correct answer. Unspecific moral or ethical concerns such as “drugs are bad because they are illegal” will not be counted as an answer.

c) This answer should come from a reasoning given in parts (a) and (b). There are many ways to give a reasonable answer to this question. Discussions could be about elasticities of supply/demand, eradicating externalities, costs of enforcement, tradeoffs and constraints of enforcement, probability of adjudication. If the argument involves some type of mental model, discussion of the assumptions under which the mechanism is under work will get extra points. The full score will be given if a student demonstrated knowledge of economic principles in describing the mechanisms of the argument.

Marking Scheme. Questions are graded on the scale from 0 to 10 with possible scores being 0, 3, 6, 8 and 10.

Question 4. “Inequality of Opportunity”

(30 raw points)

Economists often talk about two types of inequality – *inequality of outcomes* (such as income inequality) and *inequality of opportunity*.

a) (15 rp) Give an example of inequality of opportunity. Explain why inequality of opportunity, as opposed to inequality of outcomes, is considered detrimental for economic efficiency and social welfare.

b) (15 rp) There are several well-established measures of income inequality, such as the Gini index. How would you go about measuring inequality of opportunity in a country?

Solution

a) For example, a child of wealthy parents may be more likely to get a high-paying job than a child of poorer parents because it is easier for the former to get into an elite university or because the wealthier parents have better connections.

To demonstrate that inequality of opportunity can be bad for social welfare, consider the following extremely stylized example. Suppose there are two types of jobs – low-skill and high-skill. Any person working in a low-skill job produces one unit of output. The output of a person in a high-skill job is equal to her productivity A . Suppose a person from a low-income family happens to have higher productivity than a person from a rich family: $A_{poor} > A_{rich}$. Ideally, the society would want to let the former have the high-skill job (after training, if necessary), thus enjoying the total output of $1 + A_{poor}$. However, if the poor is barred from the high-skill job due to inequality of opportunity, the total output will be $1 + A_{rich}$, which is lower. The moral is that inequality of opportunity acts as a constraint for a society seeking an optimal allocation of resources.

In contrast, inequality of outcomes can be just a natural consequence of different abilities and different levels of effort chosen by people, even if the allocation of resources is optimal.

b) A popular approach to measuring inequality of opportunity is to measure the extent to which parents' income or wealth determines their children's income or wealth. For example, one can consider the parents who are within 10% richest people and ask which share of their children is also within 10% richest people. Or the other way around: one may ask which share of 10% poorest people's children remains in the bottom 10% of the income distribution. The higher these shares, the higher is the inequality of opportunity. Indeed, if the rich remain rich and poor remain poor, the inequality of opportunity must be severe. And vice-versa: if children's income depends little on that of their parents', this probably means that the opportunities are close to equal.

One can find more information on this topic, as well as research attempting to compute measures of inequality of opportunity for the US at <https://opportunityinsights.org>

Question 5. “Connecting Short Run and Long Run” (30 raw points)

Fighting economic crises and recessions has become one of the well-recognized functions of government. But are the fluctuations around the trend really important? In most recessions, the fall in GDP is not more than 3-4 % and the return to the trend is relatively quick. Moreover, one may argue that what is lost in a recession, may be recovered during a boom. In contrast, a one-percentage-point increase in the rate of economic growth can accumulate into a several-fold rise in GDP over the years. So shouldn't we abandon fighting recessions and concentrate fully on long-term growth instead? This task asks you to explore some connections between short run and long run and discuss if recessions are necessarily worth fighting.

a) (10 rp) Argue why recessions may have a long-term negative effect on labor market and therefore may slow down long-term growth.

b) (10 rp) Suppose that banks require a minimum level of collateral for loans, and it limits a lot of entrepreneurs from getting loans. Argue why recessions may have a negative effect on the rate of long-term innovation, while booms don't have the opposing positive effect.

c) (10 rp) Alternatively, suppose that banks do not know the quality of the investment projects of entrepreneurs and offer all applicants the same loan rate, such that it allows banks to at least break even. Argue why recessions might be stimulating long-run economic growth.

Solution

a) 5 rp: Recessions feature a decline in the aggregate demand, and as a result, a reduction in the demand for labor force. While salaries are mostly fixed contractually and are hard to change, some workers are fired, while others, mostly temporary workers, are hired for a smaller number of hours. This leads to higher rates of unemployment and a reduction in the disposable income of households.

5 rp: Unemployment and a reduction in the disposable income can have a long-lasting negative effect on the human capital stock in the economy. Some workers might lose motivation to look for a job or faith and confidence in their ability to find one, and leave labor force. Others can choose to leave the country and search for employment in another country with better economic prospects. A decline in the disposable income can negatively affect parents' ability to invest in their kids' education. Government's tax revenues are declining at the same time, so it is also constrained in its spending on education, further reducing the productivity of labor force in the country.

b) 5 rp: During recessions asset prices fall. So houses or any other tangible properties are worth less, and therefore, it is harder for entrepreneurs to pass the collateral hurdle imposed by banks. Entrepreneurs with bright innovation ideas can not implement them because they are credit-constrained. This hurts the innovation process, and slows down economic growth.

5 rp: Booms do not have a fully-offsetting positive effect. Innovation ideas that were very relevant at the time of recession might become obsolete two or three years later, when the boom period comes. This could be because entrepreneurs in other countries have implemented them already. Entrepreneurs that had the innovation ideas in recession might have gotten discouraged and pursued a different career path. In addition, profitable companies have less incentives to do risky cost-cutting innovations. Hence, they might be hesitant to

do significant business restructurings in booms, opting for safer but less innovative growth strategies.

c) 5 rp: When banks can not differentiate between good and bad projects, they have to offer all borrowers the same rate. Because among the potential borrowers some are very risky, banks have to charge a very high loan rate to compensate for the potential losses on bad projects. Both good and bad projects face high cost of borrowing, since bank can't tell the two apart. Entrepreneurs with good innovations face high, potentially prohibitively high, loan rates and are deterred from implementing their projects.

5 rp: Recessions put out of business a lot of firms, but it hits first the least profitable firms. Once they go out of business, banks have a better pool of borrowers, and can offer better loan rates to everyone. Including entrepreneurs with good innovation projects, which increases economic growth rate.

This is similar to the phenomenon of creative destruction - crisis is a time when resources are reallocated towards more productive firms through defaults of less productive ones.

Important, please note: Many students wrote that since the bank offers the same loan rate to all applicants, it means that entrepreneurs get cheap funding. It is false, and the opposite is true. The same rate does not by any means imply a low rate. To break even on a pool of borrowers, some of which are very risky, the bank has to charge a very high loan rate. Think about payday loans vs mortgages — payday loans are extremely expensive because a lot of borrowers default on their loans, and to cover these losses lenders charge all borrowers high rates, sometimes as high as 1 % a day. Mortgages, on the other hand, have smaller loan rates. This is because banks first of all screen all borrowers and make sure only credit-worthy borrowers get the loan, and second, they use the house as a collateral. In case the mortgage is not repaid, the bank can seize the house and sell it to cover the losses on the loan. Therefore, the bank can offer a very low rate for mortgages.

Because banks do not know which projects are good or bad, they charge all projects the same rate. Good projects could have gotten a much smaller rate if the bank could see the quality of their project, but it can not. Recessions help the good entrepreneurs reveal to the bank that they are in fact of good quality, and once low quality entrepreneurs exit the market, high quality entrepreneurs receive loans at a smaller rate.

2018 年国际经济学奥林匹克竞赛

International Economics Olympiad

经济学测评 Economics

~**真题** Problems~

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*?

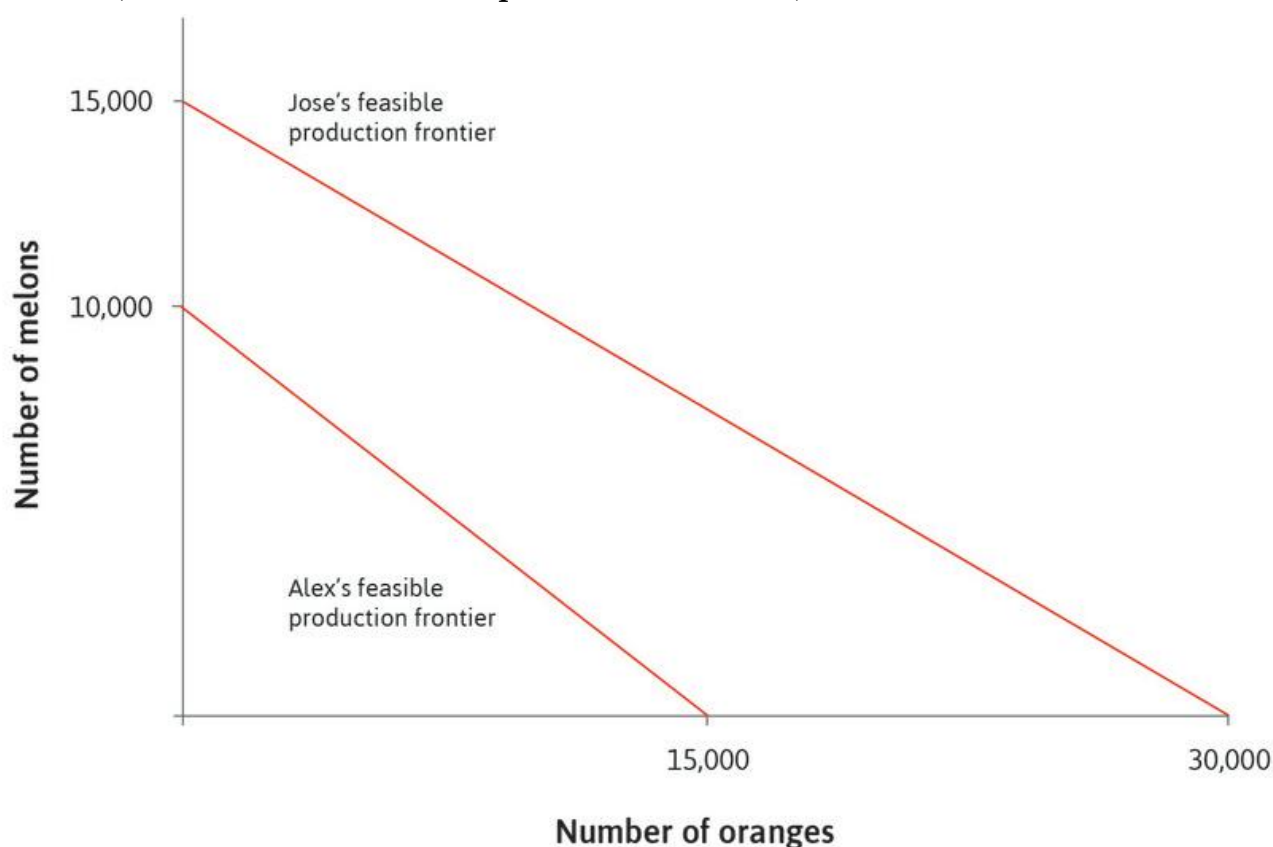
1) An increase in the trade surplus would lead to a decrease in a country's current account.

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

International Economics Olympiad

Moscow

Economics

Problems

Solve no more than 4 problems out of 5. Indicate your choice of problems to grade on page 3 of your paper.

If you provide solutions for all 5 problems, all of them will be commented by the Jury but only 4 will add to your score. In this case, if you do not specify which to grade, the maximum grade of 5 will be excluded.

Every problem is worth 30 points.

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.

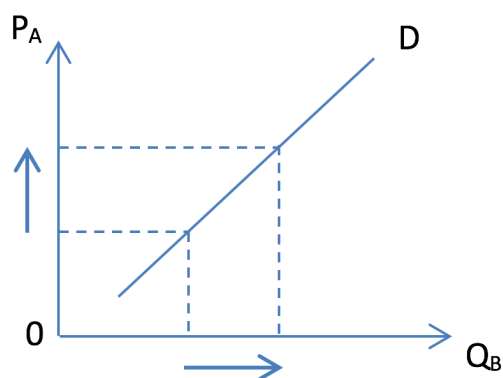
b) (10 pr) Suppose that A and B are not only substitutes in consumption but also complements in production. What can you say about the resulting change in the price of B? Explain in detail.

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

Solution

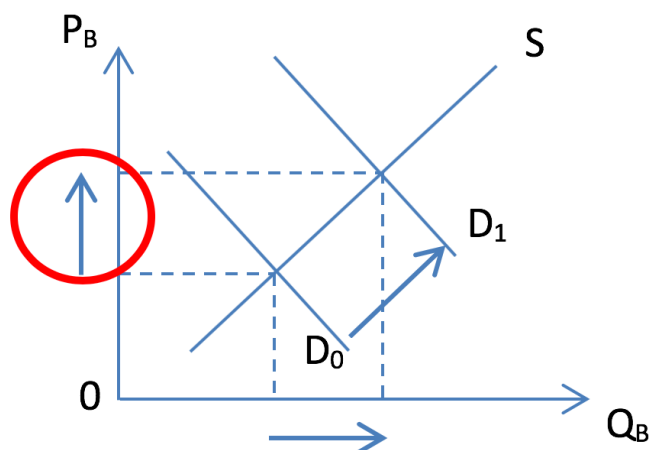
a) If number of customers for good A increases, this means that demand for good A will increase and demand curve will shift to the right thus increasing price and quantity demanded for product A (see Pic.1)

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)



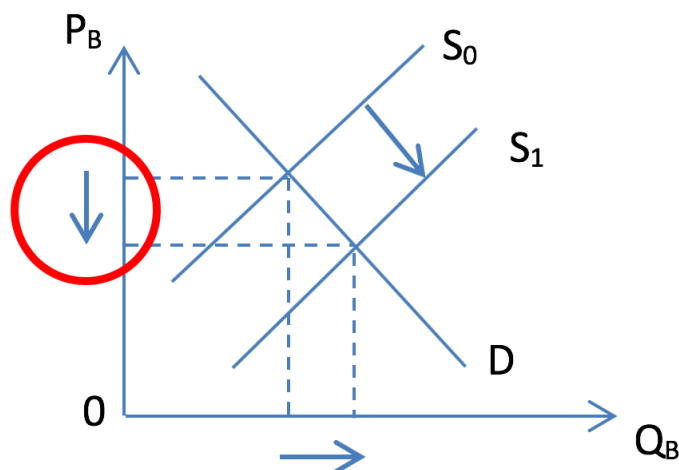
Pic.2. Substitute products A and B (case of cross-price)

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*¹), 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 might 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*². 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.

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

²For 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

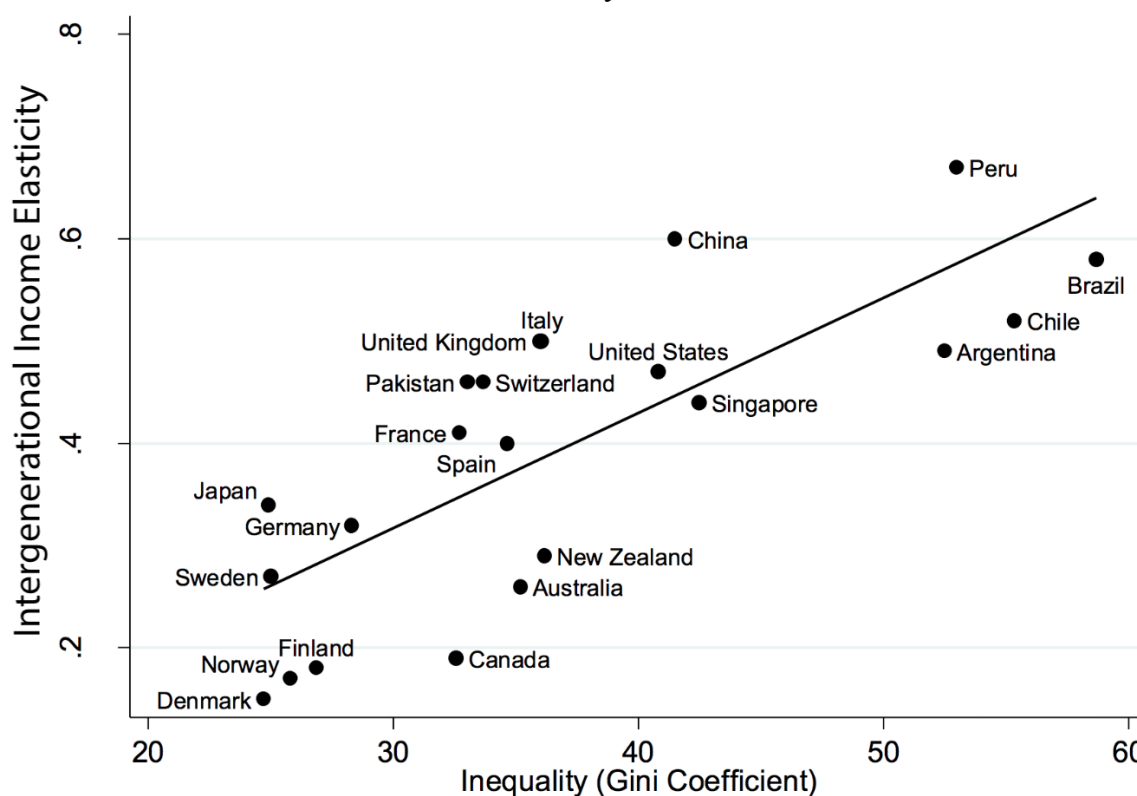
- 0 No significant answer or answer that doesn't fit the question
- 5 Partial answer. Answer fits the question, but some parts are not explained well or unclear. For example, if in part a) the contestant only says that increasing the fine for the official will create a disincentive to extort bribes.
- 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 show the relation between inequality and intergenerational income elasticity. Sometimes it is called *The Great Gatsby Curve*³.



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:

³The term is attributed to Alan Krueger.

- 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

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 there 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.