Professorship for Economics of Innovation
Prof. Dr. Hanna Hottenrott

Exam: Economics II – Summer Term 2019

Answer Sheet

Surname: Gu

First Name: Tianhao

Signature: Tianhao Gu

Student Number: 0

Example:

Proper: A ● C D ⇨ Answer B

Improper: A ⊗ C D

Correction: A ● ● D ⇨ Answer C

Please mark your answers with a blue or black pen!

1: A B C D	11: A B C D	21: A B C D	31: A B C D
2: A B C D	12: A B C D	22: A B C D	32: A B C D
3: A B C D	13: A B C D	23: A B C D	33: A B C D
4: A B C D	14: A B C D	24: A B C D	34: A B C D
5: A B C D	15: A B C D	25: A B C D	35: A B C D
6: A B C D	16: A B C D	26: A B C D	36: A B C D
7: A B C D	17: A B C D	27: A B C D	37: A B C D
8: A B C D	18: A B C D	28: A B C D	38: A B C D
9: A B C D	19: A B C D	29: A B C D	39: A B C D
10: A B C D	20: A B C D	30: A B C D	40: A B C D

Exam: Economics II

Professorship for Economics of Innovation
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Instructions:

1. Including the answer sheet, the exam consists of 24 pages. Please check whether your copy is complete.
2. The exam is available in English.
3. The exam consists of 40 multiple choice problems (MCP).
   - Each MCP has 4 possible answers **(A)** − **(D)**, of which exactly one is correct.
   - For each MCP, please indicate the answer you deem correct by filling out the corresponding letter circle on the answer sheet.
   - If you select the correct answer, you receive 3 points for the MCP.
   - If you select a wrong answer or no answer at all, you receive 0 points for the MCP.
   - If you select several answers or if your selection is unclear, you receive 0 points for the MCP.
4. Only the answer sheet is used to determine your grade.
5. **Do not separate the answer sheet and instructions from the other pages.**
6. Unless otherwise specified, the labelling of variables and parameters is identical to the notation used in the lectures and exercise classes.
7. Permitted materials: non-programmable scientific calculator, dictionnary
8. In total, you have 120 minutes for answering the 40 MCP and filling out the answer sheet.

Problem 1

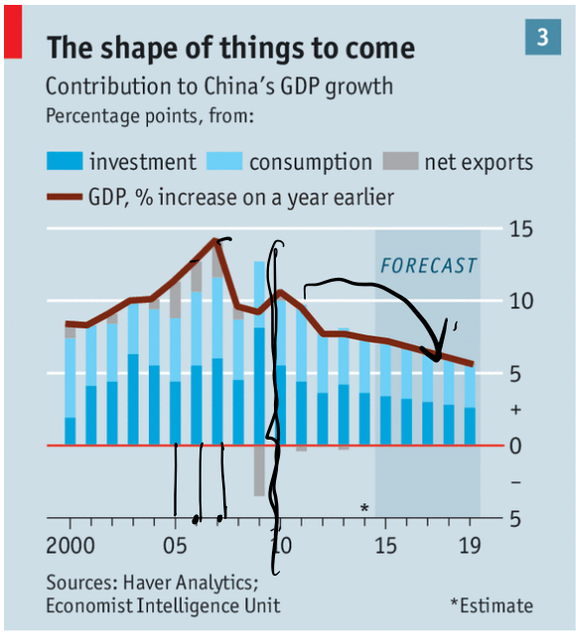


Figure 1: Contribution of different components to GDP growth in China
Years 2000-2019 (x-axis), change in % compared to the previous year (y-axis) (Source: The Economist)

Which of the following statements regarding Figure 1 is correct?

(A) In all years, the contribution of government spending to GDP growth in China was the largest out of all presented components.

(B) Averaged over all years, consumption contributed around 10 percentage points to Chinese GDP growth.

(C) Since the GDP growth rate has been falling since 2010, Chinese GDP in 2019 must be smaller compared to 2000.

(D) From 2006 to 2007, the Chinese GDP grew by almost 15%.

Problem 2

Consider an economy with three producers, a cattle breeder, a dairy farm and an icecream firm:
The cattle breeder imports calves worth 1,500 Euros from abroad and raises them to dairy cows, which he sells for 6,000 Euros to the dairy farm later in the same year. The cattle breeder's wage costs are 1,500 Euros for domestic workers and 1,000 Euros for foreign workers.
The dairy farm milks the cows and extracts milk worth 20,000 Euros, of which it sells 75% to the icecream firm and 25% to domestic customers. The dairy farm's wage costs are 2,000 Euros and its capital costs are 1,000 Euros.
The icecream firm processes the milk into icecream worth 50,000 Euros, selling half of it to consumers abroad and the remaining half to domestic ones. The icecream firm's wage costs are 3,000 Euros and its capital costs are 2,000 Euros.

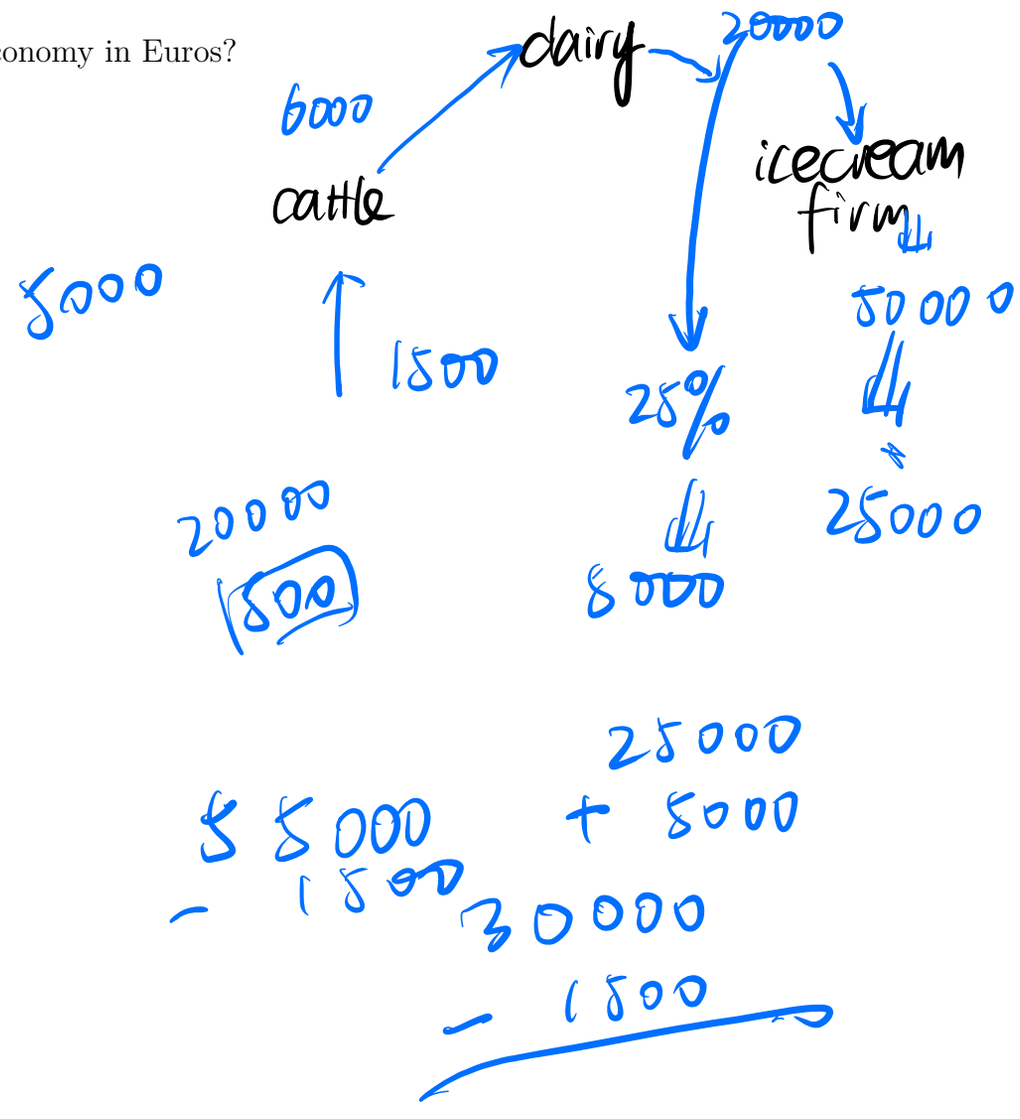
What is the GDP of the economy in Euros?

(A) 38,500

(B) 53,500

(C) 54,500

(D) 55,000



Problem 3

Country	UK		Germany	
Year	2016	2017	2016	2017
GDP*	2,650,850	2,622,433	3,477,796	3,677,439
Population	65,595,565	66,022,273	82,348,669	82,695,000

Table 1: GDP and population for the United Kingdom (UK) and Germany in 2016-2017 (Source: World Bank)

*in 2018 prices and in million US Dollars

Which of the following statements regarding Table 1 is correct?

(A) UK's GDP per capita growth rate is -1.71% and Germany's total GDP growth rate is 5.74%.

(B) UK's GDP per capita growth rate is -1.71% and Germany's total GDP growth rate is 5.3%.

(C) UK's total GDP growth rate is 1.07% and Germany's GDP per capita growth rate is 5.3%.

(D) UK's total GDP growth rate is -10.7% and Germany's GDP per capita growth rate is 5.3%.

Problems 4-5 refer to the following scenario:

Consider an economy with the following Cobb-Douglas-production function:

$$Y = F(K, L) = \frac{L^2}{3} \cdot 2K^3$$

where K is the capital stock, L is the employed labour force and Y describes the total output of the economy.

Problem 4

Compute the marginal product of the input factors labour, L, and capital, K. The marginal product of labour, MP_L, and marginal product of capital, MP_K, are:

(A) $MP_L = \frac{4K^2}{3L^{-1}}$ and $MP_K = \frac{2L^2}{K^{-2}}$

(B) $MP_L = \frac{4K^3}{3L^{-1}}$ and $MP_K = \frac{L^2}{2K^{-2}}$

(C) $MP_L = \frac{4K^3}{3L^{-1}}$ and $MP_K = \frac{L^2}{2K^{-2}}$

(D) $MP_L = \frac{4K^3}{3L^{-1}}$ and $MP_K = \frac{2L^2}{K^{-2}}$

Problem 5

What is the marginal rate of technical substitution of L and K, $MRTS_{L,K}$?

(A) $MRTS_{L,K} = \frac{3}{2}\frac{K}{L}$

(B) $MRTS_{L,K} = \frac{4}{3}\frac{K}{L}$

(C) $MRTS_{L,K} = \frac{2}{3}\frac{K}{L}$

(D) $MRTS_{L,K} = \frac{3}{4}\frac{K}{L}$

Problem 6

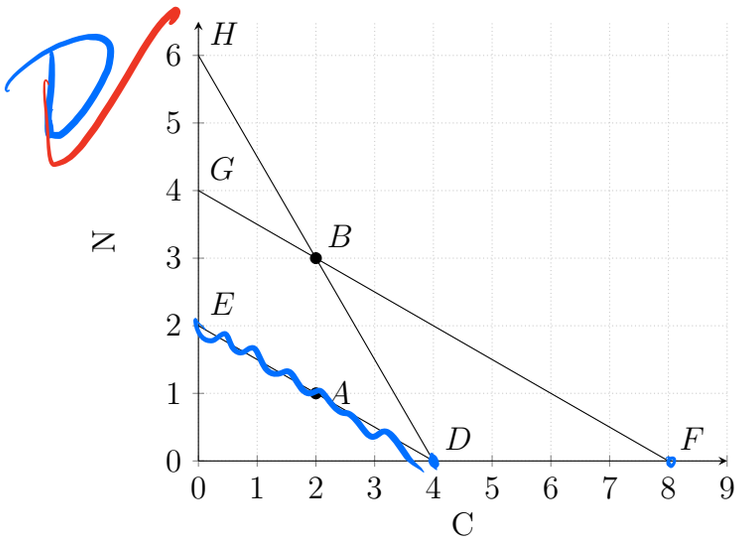


Figure 2

Technology	Coal (t)	No. of workers	Total costs (KOP)
Scenario 1: 10 KOP per tonne of coal, 20 KOP wage			
A	2	1	
B			
Scenario 2: 15 KOP per tonne of coal, 10 KOP wage			
A			
B			

Figure 2 illustrates two technologies, A and B, of which each can roast 100 kg of coffee beans, and the associated isocost lines. The x-axis depicts the tonnes of coal (C), and the y-axis the number of workers (N). In Scenario 1, the wage per worker is 20 KOP (Coalumbian Pesos) and the price of coal per tonne is 10 KOP. In Scenario 2 the wage per worker is 10 KOP and the price of coal per tonne is 15 KOP. Which of the following statements is correct?

(A) The price ratio along isocost line DE is higher compared to isocost line FG, i.e. trading workers into tonnes of coal ($\frac{worker}{coal}$) on DE is relatively more expensive than on FG.

(B) The costs for coal in Scenario 1 rise by 10 KOP when switching from technology A to B.

(C) The total costs for technology B rise by 20 KOP when switching from Scenario 1 to 2.

(D) Out of the four combinations of a scenario with a given technology (1A, 1B, 2A, 2B), the cheapest and the most expensive combination differ by 40 KOP.

Problems 7-11 refer to the following scenario:

Consider an open economy with output Y, private consumption C, autonomous consumption c_0, marginal propensity to consume c_1, investment I, government spending G, tax rate t, exports X and imports M. The budget balance of the government is given as $BB = tY - G$.
The economy's situation can be described as follows:

$$C = c_0 + c_1(1-t)Y \qquad c_0 = 200 \qquad c_1 = 0.4$$

$$I = 800 \qquad X = 500 \qquad M = 0$$

Problem 7

Given government spending of $G = 500$ and a tax rate of $t = 0.5$, in the goods market equilibrium, output (Y) and budget balance (BB) are:

(A) $Y = 1,250$ and $BB = 0$

(B) $Y = 1,250$ and $BB = 125$

(C) $Y = 2,500$ and $BB = 0$

(D) $Y = 2,500$ and $BB = 750$

Problem 8

Given a tax rate of $t = 0.5$, coming from any equilibrium of the goods market, an increase in government spending G of 100 results in ...

(A) ... an increase of equilibrium output Y of 100.

(B) ... an increase of equilibrium output Y of 125.

(C) ... an increase of equilibrium output Y of 500.

(D) ... an increase of equilibrium output Y of 625.

Problem 9

Given the government's budget must be in balance ($BB = 0$), what is the tax rate t which results in an output of $Y = 3000$ in the goods market equilibrium?

(A) $t = \frac{1}{6}$

(B) $t = \frac{4}{9}$

(C) $t = \frac{2}{3}$

(D) $t = 1$

Problem 10

Given the government's budget must be in balance ($BB = 0$) and investment I is fixed, an increase in tax rate t results in ...

(A) ... no change in equilibrium output Y.

(B) ... an increase in equilibrium output Y.

(C) ... a decrease in equilibrium output Y.

(D) ... a decrease in equilibrium government spending G.

Problem 11

Which of the following statements is true?

(A) In general, the lower the marginal propensity to consume c_1, the stronger the response in the economy to a change in government spending G.

(B) In general, the lower autonomous consumption c_0, the weaker the response in the economy to a change in government spending G.

(C) The paradox of thrift describes, that aggregate attempts of households to increase their savings decrease the GDP of the economy.

(D) Counter-cyclical fiscal policy means to reduce aggregate demand in booms by lowering taxes and increasing government spending and to stimulate aggregate demand in recessions with higher taxes and lower government spending.

Problems 12-13 refer to the following scenario:

Assume that Christoph works 40 hours a week as a research assistant at the TUM. He is paid \$600 per week. Christoph's disutility of effort from working one hour is \$5. Teaching the Economics II tutorial yields him additional utility of \$1 per hour from his intrinsic motivation. If he fails to keep his job, Christoph expects 35 weeks of unemployment. In case of unemployment, he receives a weekly transfer payment from the government of \$110 and experiences psychological costs of unemployment of \$2 per hour.

Problem 12

Which of the following statements is true?

(A) Christoph's employment rent per hour is \$8.25.

(B) Christoph's employment rent per hour is \$9.25.

(C) Christoph's employment rent per hour is \$10.25.

(D) Christoph's employment rent per hour is \$12.25.

Problem 13

Assume that the government decides to increase the unemployment benefits to a weekly payment of \$120. After the increase in unemployment benefits...

(A) Christoph's total employment rent for the expected unemployment duration is \$12,600.

(B) Christoph's total employment rent for the expected unemployment duration is \$13,000.

(C) Christoph's total employment rent for the expected unemployment duration is \$13,600.

(D) Christoph's total employment rent for the expected unemployment duration is \$14,000.

Problem 14

Which of the following considerations leads ceteris paribus to an increase in the employment rent?

(A) A decrease in the disutility of effort.

(B) A decrease in wage.

(C) A decrease in the duration of unemployment.

(D) A decrease in unemployment.

Problems 15-18 refer to the following scenario:

Consider an economy with an inelastic supply of labour force given by $L^S = 30$. A representative, price-taking, efficiency-wage setting, and profit maximising firm only employs the factor labour to produce its output given by

$$Y = F(e \cdot L) = 4 \cdot [e(w) \cdot L]^{\frac{1}{2}}.$$

Hereby, the efficiency of labour (effort) depends on the wage w and is given by

$$e(w) = 6 \cdot w^{\frac{1}{2}} - 6.$$

The firm can sell its product at a price of $p = 4$.

Problem 15

What is the efficiency-wage w_e of the economy?

(A) $w_e = 1$

(B) $w_e = 2$

(C) $w_e = 3$

(D) $w_e = 4$

Problem 16

What is the unemployment rate u_e of the economy due to the efficiency-wage?

(A) $u_e = 20\%$

(B) $u_e = 25\%$

(C) $u_e = 30\%$

(D) $u_e = 35\%$

Problem 17

What is the profit Π of the firm, given that it pays the efficiency-wage?

(A) $\Pi = 24$

(B) $\Pi = 48$

(C) $\Pi = 72$

(D) $\Pi = 96$

Problem 18

The unions believe that the efficiency wage is too low and consider demanding the introduction of a minimum wage w_{min} from the government. Which of the following considerations are correct?

(A) The introduction of a minimum wage of $w_{min} < w_e$ decreases both the level of effort per employee and the profits of the firm.

(B) The introduction of a minimum wage of $w_{min} > w_e$ decreases the level of effort per employee and increases the profits of the firm.

(C) The introduction of a minimum wage of $w_{min} > w_e$ increases both the level of effort per employee and the profits of the firm.

(D) The introduction of a minimum wage of $w_{min} > w_e$ increases the level of effort per employee and decreases the profits of the firm.

Problems 19-21 refer to the following scenario:

Assume an economy with three groups of citizens: The unemployed, the employed, and the employers (owners). In this economy, u is the fraction of the population that is unemployed, n is the fraction of the population that is employed, w is the real wage, q is the output per employed worker, and $s = w/q$ is the wage share received by workers.

Problem 19

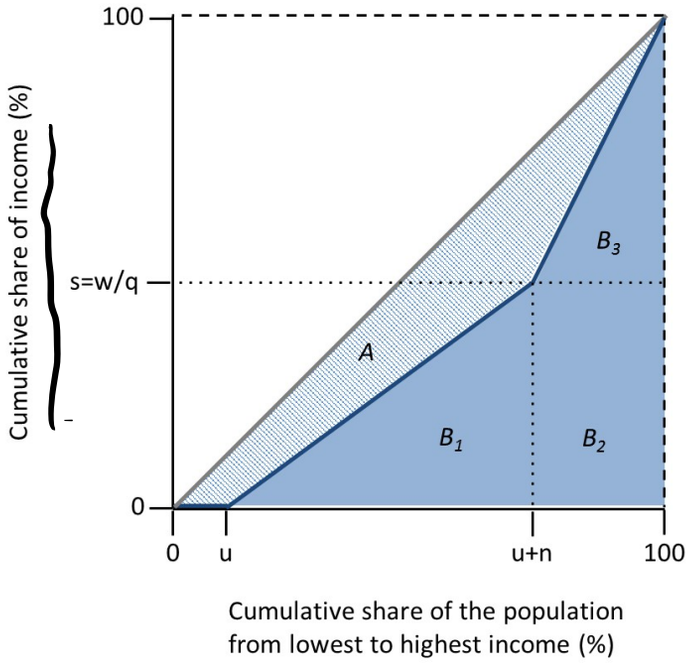


Figure 3

How do you calculate the Gini Coefficient based on the information provided in Figure 3?

(A) Area A divided by area B2.

(B) Area A divided by the sum of areas A, B1, B2 and B3.

(C) The sum of areas B1, B2 and B3 divided by area A.

(D) Area A minus the sum of areas B1, B2 and B3.

Problem 20

How do you interpret the Gini coefficient of income distribution?

(A) A larger Gini coefficient implies higher inequality in the income distribution.

(B) A smaller Gini coefficient implies higher inequality in the income distribution.

(C) A larger Gini coefficient is the result of more income redistribution.

(D) A smaller Gini coefficient implies that there is too little redistribution.

Problem 21

Which of the following statements is true?

(A) If the class of employers gets relatively smaller, then $u + n$ rises and - ceteris paribus - the Gini coefficient increases.

(B) An increase in the wage share, ceteris paribus, increases the Gini coefficient.

(C) If unemployment increases, i.e., u gets larger, then - ceteris paribus - the Gini coefficient decreases.

(D) If the class of employers gets relatively larger, then $u + n$ shrinks and - ceteris paribus - the Gini coefficient increases.

Problem 22

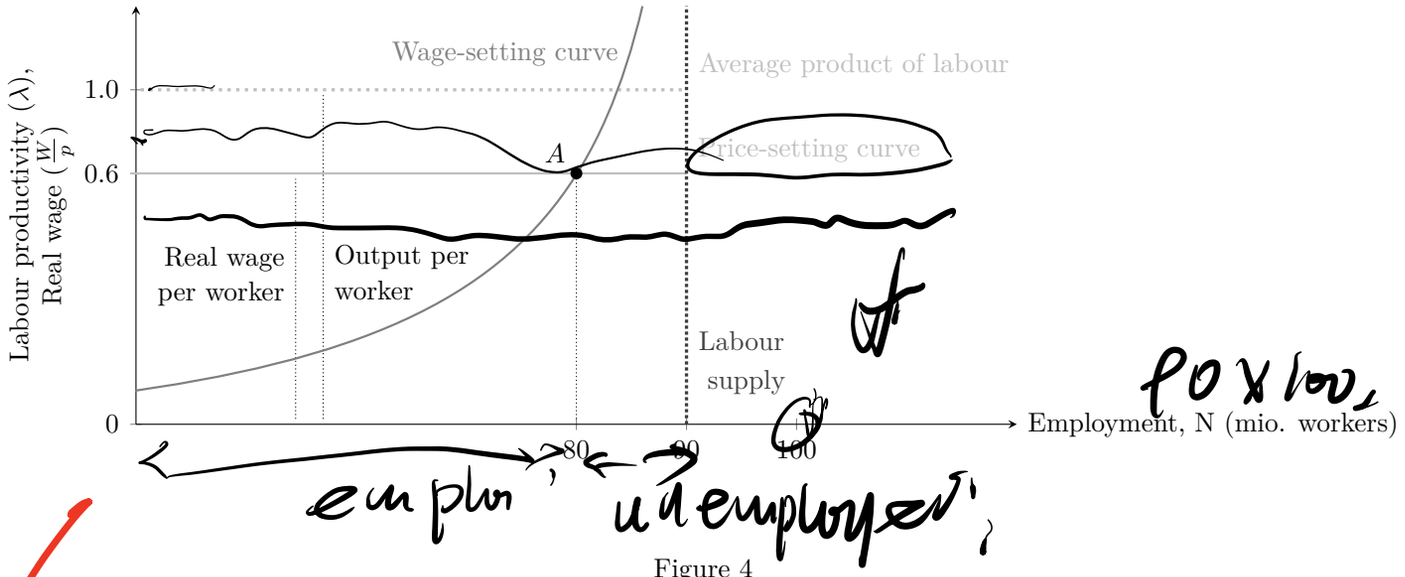


Figure 4

Figure 4 depicts the model of a labour market where there is a labour supply of 90 million workers. The current labour market equilibrium is at A. Now consider the case where the labour supply increases to 100 million. Which of the following statements is true regarding the adjustment process in the labour market?

(A) Initially, unemployment increases by 10%.

(B) Higher unemployment results in a reduction in the average employment rent enjoyed by workers employed at the current wage.

(C) The firms are required to raise wages in order to induce workers to work hard.

(D) The wage-setting curve shifts downward.

Problem 23

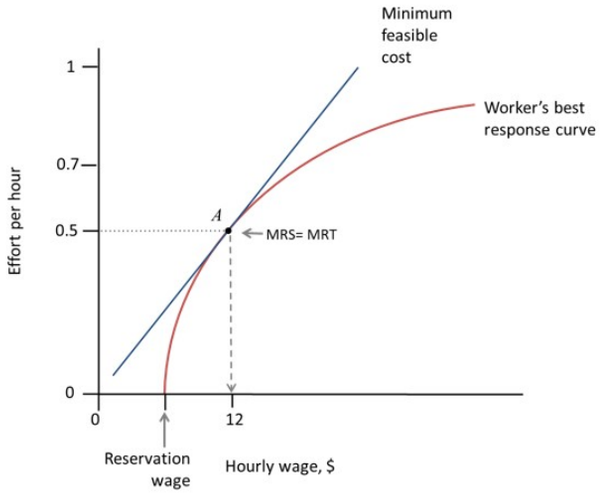


Figure 5

Figure 5 depicts the worker's best response curve ($WBRC$) for the employees and the isocost line of effort for the employers from the labour discipline model. Which of the following statements is true?

(A) A cut in unemployment benefits shifts the $WBRC$ to the left such that the equilibrium wage falls for a given unemployment rate.

(B) A cut in unemployment benefits shifts the $WBRC$ to the right such that the equilibrium wage increases for a given unemployment rate.

(C) Higher unemployment means that the $WBRC$ shifts to the left and the equilibrium wage increases for a given unemployment rate.

(D) Lower unemployment means that the $WBRC$ shifts to the right and the equilibrium wage decreases for a given unemployment rate.

Problem 24

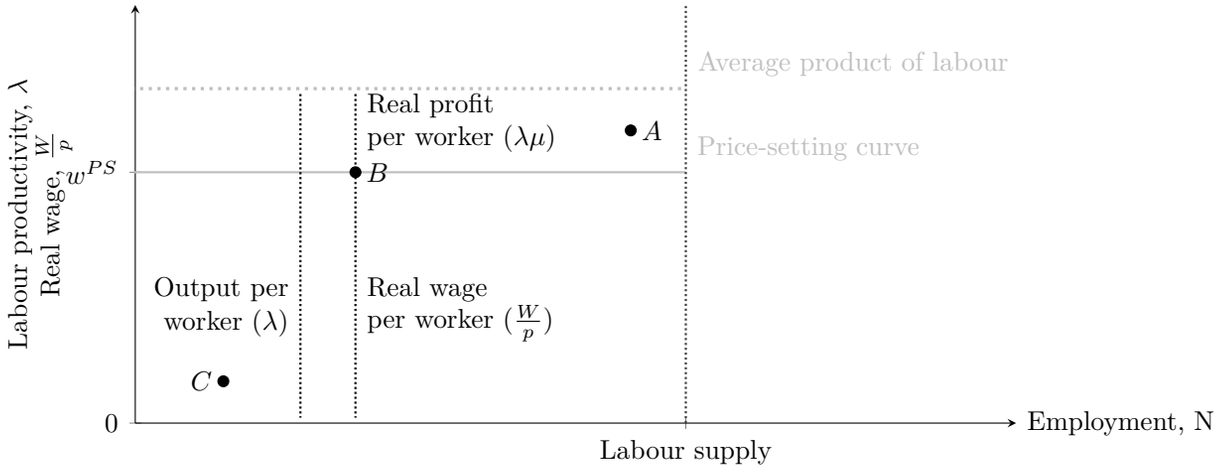


Figure 6

Which of the following statements is true based on the information provided in Figure 6?

(A) Less competition in the product market implies an upward shift of the price-setting curve.

(B) At point A, the markup is too high, and therefore the firm will raise its price. This leads to lower demand for the good and lower employment at B.

(C) At point C, the real wage is too low and the markup is too high. Therefore, the firm is able to increase profits by lowering prices and hiring more workers.

(D) Holding the markup fixed, higher labour productivity implies a lower price-setting curve, which means a lower real wage.

Problem 25

Which of the following statements is true?

(A) Bank money can only be created by the central bank.

(B) The bank lending rate is the interest rate commercial banks receive for their reserves on their central bank accounts.

(C) Base money includes the sum of total cash in circulation of the respective currency.

(D) The policy interest rate is determined by supply and demand on the money market.

Problem 26

Consider two periods in the lives of Anneliese and Karl-Heinz. Both have an income in period 1, but none in period 2. In period 1 they have the possibility to invest any fraction of their money and to consume the resulting payment in period 2. There is no other possibility to transfer money from period 1 to period 2. The feasible frontiers of Anneliese and Karl-Heinz, with consumption in period 1 (C_1) on the horizontal axis and consumption in period 2 (C_2) on the vertical axis, are given in Figure 7.

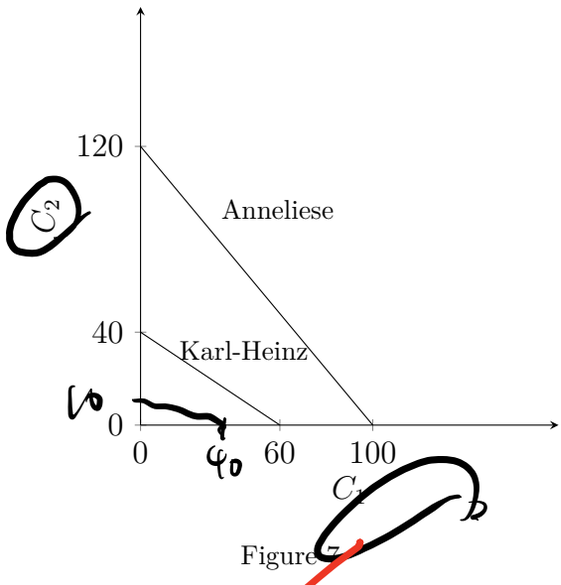


Figure 7

Which of the following statements is true?

(A) Anneliese and Karl-Heinz receive the same interest rate on their investments.

(B) Karl-Heinz can afford a consumption of 40 units in period 1 and 10 units in period 2.

(C) Anneliese can afford a consumption of 40 units in period 1 and 80 units in period 2.

(D) Karl-Heinz definitely consumes his whole income in period 1.

Problems 27-28 are based on Table 2.

Period	Lagged inflation rate (% increase)	Unemployment rate (% of labour force)	Inflation rate (% increase)	Real wage growth (% increase)
Jan 2017	0.5	3.9	1.6	1
Jul 2017	1.6	3.7	1.4	1
Jan 2018	1.4	3.5	1.4	0.7
Jul 2018	1.4	3.4	1.9	0.8
Jan 2019	1.9	3.2	1.4	1.4

Table 2: Inflation rates and labour market statistics for Germany, Jan 2017 - Jan 2019
(Source: Federal Statistical Office)

The lagged inflation rate in Table 2 is the observed inflation rate from the previous period. Assume that employees are naive and expect the inflation rate in the current period to correspond to the one from the previous period. Real wage growth rate equals the growth rate of nominal wages minus the inflation rate.

Problem 27

Which one of the following statements is true?

(A) The employers had higher bargaining power compared to the employees throughout all observed periods of time.

(B) Assuming the labour market was initially in equilibrium, falling unemployment was accompanied by a series of price and wage increases.

(C) Nominal wages fell continuously.

(D) The observed inflation and unemployment rates are throughout consistent with the Phillips curve hypothesis.

Problem 28

Given that the nominal interest rate in Germany remained stable at zero since April 2016, which of the following was observed between January 2017 and January 2018?

(A) A deflationary pressure.

(B) Non-negative real interest rates.

(C) The employment rate remained constant.

(D) Nominal wages grew at a falling rate.

Problem 29

Which of the following statements about the bargaining gap is true?

(A) The bargaining gap is the difference between the wage demanded by the employees at a given level of employment and the wage offered by the employers at a given level of aggregate demand.

(B) The bargaining gap perfectly explains the discrepancy between the observed and the expected inflation rates in any economy.

(C) A negative bargaining gap induces the employers to increase wages.

(D) A positive bargaining gap implies higher bargaining power for the employers.

Problems 30-31 are based on Table 3.

Consider a closed economy, which produces only two goods: cheese and wine. The base period for all calculations is 2016.

	Cheese		Wine	
	Output (in kg)	Price (per kg)	Output (in litres)	Price (per litre)
2016	1000	3	850	10
2017	800	5	1000	8
2018	750	6	700	12

Table 3

Problem 30

Which of the following statements is true?

(A) In 2017, nominal GDP was equal to real GDP.

(B) From 2017 to 2018, real GDP fell by about 25%.

(C) From 2016 to 2018, nominal GDP increased by less than 10%.

(D) In 2018, nominal GDP was lower than real GDP.

Problem 31

Which of the following statements is true?

(A) Using the GDP deflator, inflation between 2016 and 2017 was above 90%.

(B) The Consumer Price Index (CPI) in 2018 was twice as high as the CPI in 2017.

(C) The GDP deflator in 2018 was about 1.39.

(D) Using the CPI, a given consumption bundle containing 100 kg cheese and 100 litres of wine became 10% costlier between 2016 and 2017.

Problem 32

In Table 4, the exchange rates for the Euro (EUR) against the South Korean Won (KRW) and the Emirati Dirham (AED) are given.

	30/06/2017	30/06/2018
KRW/EUR	1,306.32	1,302.23
AED/EUR	4.19	4.29

Table 4: Source https://www.xe.com/currencytables

Which of the following statements is correct?

(A) In comparison to the exchange rate on 30/06/2017, the KRW has overall depreciated against the EUR a year later.

(B) For South Korea, importing from Germany became cheaper on 30/06/2018 compared to a year ago.

(C) In comparison to the exchange rate on 30/06/2017, the AED has overall appreciated against KRW on 30/06/2018.

(D) Ceteris paribus, European demand for Emirati products should be overall lower at the end of June 2018 compared to a year ago.

Problem 33

In March 2019, the European Central Bank (ECB) announced the third phase of its targeted longer-term refinancing operations (TLTRO). Under these operations, the ECB provides longer-term (up to 4 years) funding at attractive conditions to commercial banks. What is the ECB's strategy?

(A) The ECB pursues a contractionary monetary policy to maintain a high policy rate which will discourage private sector lending.

(B) The ECB pursues an expansionary monetary policy to boost investment in the stock market.

(C) The ECB pursues an expansionary monetary policy to strengthen the real economy and to avoid a recession.

(D) The ECB pursues an expansionary monetary policy to counteract high inflation.

Problems 34 to 38 refer to the following scenario:

Consider an economy with the following Cobb-Douglas-production function:

$$Y = K^{\alpha}(LE)^{1-\alpha}$$

where K is the capital stock, L is the employed labour force and E is the efficiency of the economy. Assume a savings rate s, a population growth rate n, a depreciation rate δ and a growth rate g for the technological progress.

Problem 34

What is the production function per unit of effective labour of the economy?

(A) $f(k) = k^{\alpha}$ with $k = \frac{K}{LE}$

(B) $f(k) = k^{\alpha-1}$ with $k = \frac{K}{LE}$

(C) $f(k) = k$ with $k = \frac{K}{LE}$

(D) $f(k) = k^{1-\alpha}$ with $k = \frac{K}{LE}$

Problem 35

What is the golden rule capital stock per unit of effective labour of the economy that maximises consumption per unit of effective labour in the steady state?

(A) $k^{GR} = \left(\frac{n+\delta+g}{\alpha}\right)^{\frac{1}{1-\alpha}}$

(B) $k^{GR} = \left(\frac{\alpha}{n+\delta+g}\right)^{\frac{1}{1-\alpha}}$

(C) $k^{GR} = \left(\frac{\alpha}{n+\delta+g}\right)^{1-\alpha}$

(D) $k^{GR} = \left(\frac{n+\delta+g}{\alpha}\right)^{1-\alpha}$

Problem 36

What is the golden rule savings rate of the economy that maximises consumption per unit of effective labour in the steady state?

(A) $s^{GR} = \alpha$

(B) $s^{GR} = 1 - \alpha$

(C) $s^{GR} = \frac{\alpha}{1-\alpha}$

(D) $s^{GR} = \frac{1}{1-\alpha}$

Problem 37

The government of the economy invests into a programme that reduces population growth. How does the golden rule savings rate change if all other variables remain constant?

(A) The golden rule savings rate increases.

(B) The golden rule savings rate decreases.

(C) The golden rule savings rate remains constant.

(D) No statement can be made about the change in the golden rule savings rate.

Problem 38

Which of the following statements is correct?

(A) The steady state consumption per capita of the economy increases at a rate equal to the depreciation rate δ.

(B) The steady state output per capita of the economy increases at a rate equal to the population growth rate n.

(C) The steady state capital stock per capita of the economy increases at a rate equal to the growth rate g for the technological progress.

(D) The steady state output per capita of the economy decreases at a rate equal to the population growth rate n.

Problem 39

Consider Figure 8 in which countries A and B with their GDP per worker on the vertical axis and capital per worker on the horizontal axis are illustrated for a selection of years in the period 2000-2015.

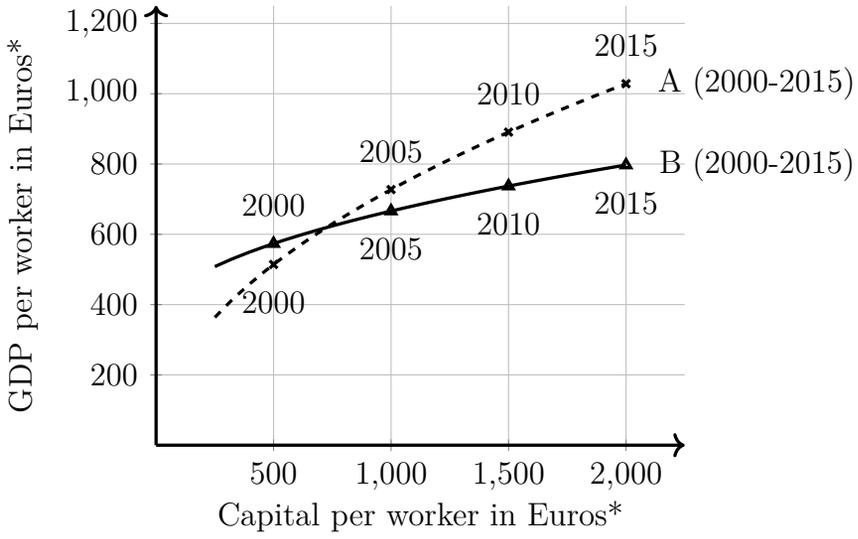


Figure 8

* corrected for purchasing power, price levels and inflation

Which of the following statements is correct in any case?

(A) There is clear evidence of technological progress in country A.

(B) During the period 2000-2015, country A experienced a higher growth in GDP per worker than country B.

(C) Country A has always been more successful than country B in attaining high GDP per worker by use of its capital.

(D) During the period 2000-2015, country A experienced a higher growth in capital per worker than country B.

Problem 40

What is meant by the adjustment gap in the context of the long-run labour market model?

(A) The time lag between the introduction and the diffusion of a new technology.

(B) The extent of equilibrium unemployment, i.e. the gap between the labour force and the employed.

(C) The extent of equilibrium employment, i.e. the gap between the labour force and the unemployed.

(D) The time lag between an outside change in labour market conditions and the new equilibrium.