20-07_macro.pdf

This box is for the Examiner only.

Question:	1	2	3	4	5	6	Total
Points:	10	9	13	6	7	15	60
Score:							

Questions

1. [**Measuring the Economy**]

   Suppose that an economy consists of only two types of products: beer and brezels. Sales and price data for these two products for two different years are as shown below:

Year	No. of beers sold	Price per beer	No. of brezels	Price per brezel
2018	1,000,000	€3	2,000,000	€1
2019	1,000,000	€2	2,000,000	€2

   (a) (4 points) Assuming that beer and brezels are final goods, calculate nominal GDP in 2018 and in 2019.

   (b) (2 points) Calculate the percentage change in **nominal GDP** between 2018 and 2019.

   (c) (2 points) Calculate the consumer price index (CPI) in 2018 and 2019, using 2018 as the base year.

(d) (1 point) Calculate the percentage change in the consumer price index between 2018 to 2019.

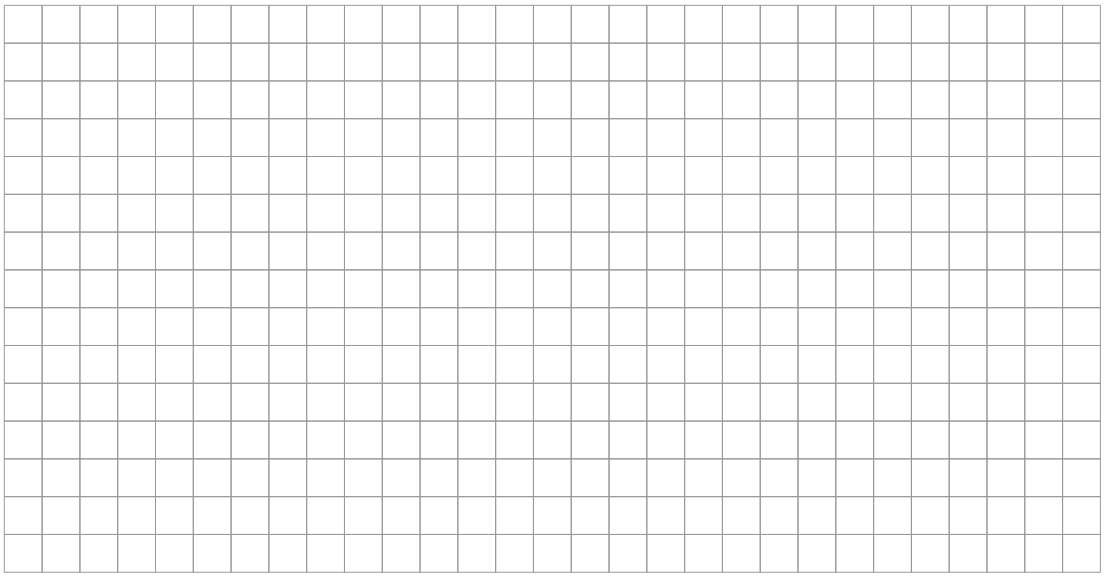
(e) (1 point) Calculate the percentage change in **real GDP** between 2018 and 2019.

2. (9 points) **[Consumer Price Index (CPI)]**

The consumer price index (CPI) is an accurate measure of the selected goods that aim to be a representative bundle of goods, but it is not a perfect measure of the cost of living. Why? Explain briefly the three sources of bias which we discussed in class.

3. [**Unemployment**] If nominal wages are downward rigid and above the market clearing level, involuntary unemployment exists.

   (a) (4 points) Sketch this scenario in a two-way graph. Please, don't forget to label axes and lines, respectively.



   (b) (9 points) There are several rational explanations why wages are downward rigid and remain above the market clearing level. Explain the three sources that we discussed in class.

4. **[European Central Bank]**

(a) (2 points) State the primary objective of the European Central Bank.

(b) (4 points) One of the most powerful instruments of central banks to influence prices are policy rates. In the course, we discussed the limited power of policy rates to stimulate investments and increase prices, respectively. Explain why the power of a further decrease in policy rates to stimulate an economy is limited once the rate is negative, i.e., below zero.

5. (7 points) [**International Investments**] In the lecture, we discussed three components to see how the value of an investment changes over time, when it was invested in an asset abroad. Describe the three components and write down the formula that allows to calculate the rate of return of an international investment.

6. **[IS-LM Model]**

The IS relation is defined by the equation

$$Y = C(Y - T) + I(Y, i) + G.$$

The LM relation is defined by the equation

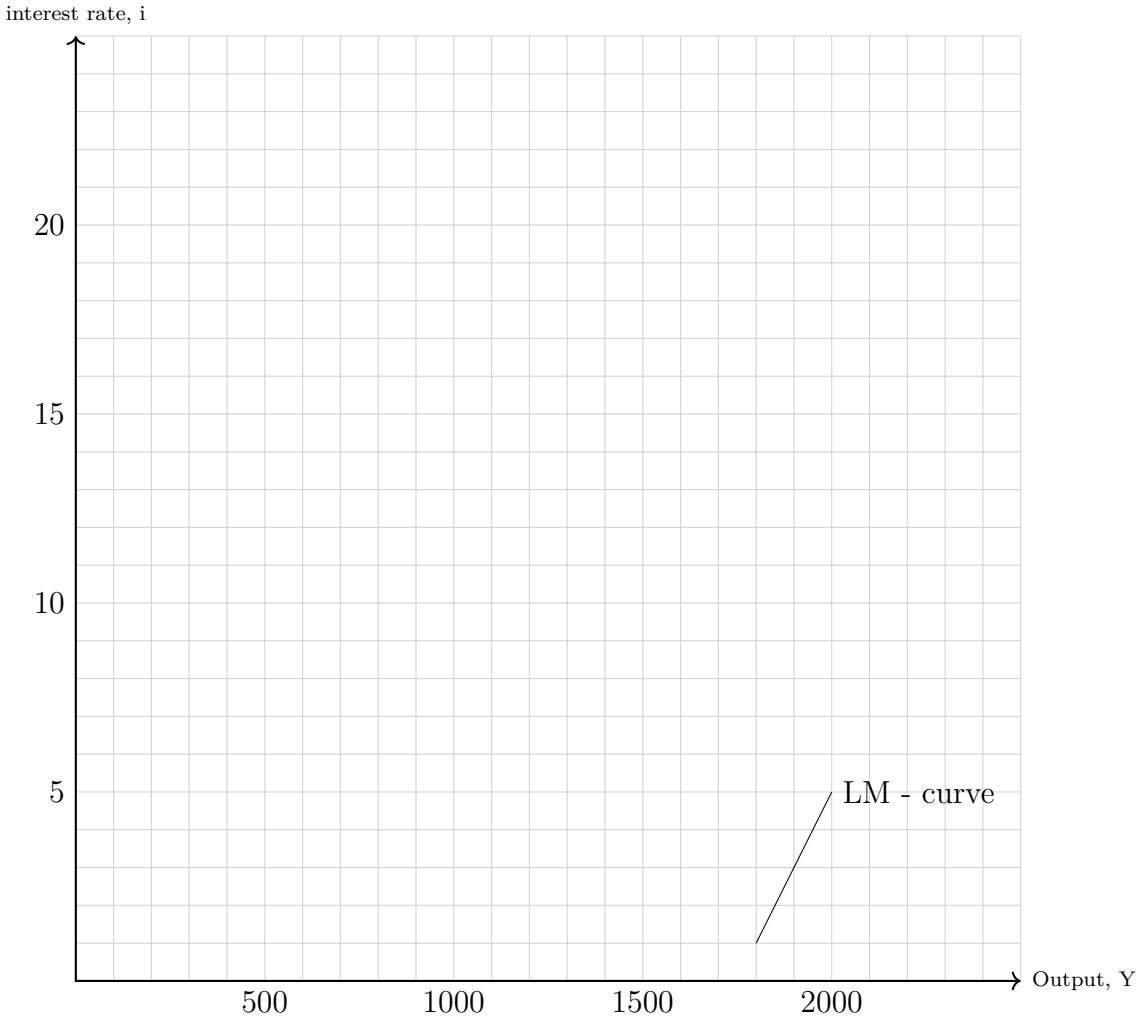
$$\frac{M}{P} = YL(i).$$

Consider an economy described by the following equations:

$$\begin{aligned} Y &= C + I + G \\ C &= 400 + 0.25(Y - T)) \\ I &= 300 + 0.25Y - 50i \\ G &= 500 \\ T &= 400 \end{aligned}$$

(a) (5 points) Derive the IS curve.

(b) (4 points) Draw the IS curve as derived in (a) into the plot below. Look on the intersection of the IS-curve with the LM-curve and state the equilibrium output and interest rate.



(c) (3 points) Explain the Taylor-rule as an alternative to the LM-curve.

(d) (3 points) Fill in the gaps of the following text:

- A monetary expansion leads to _____ (hint: *higher or lower*) output and a _____ (hint: *higher or lower*) interest rate.
- An increase in taxes shifts the IS curve to the _____ (hint: *left or right*) and leads to a _____ (hint: *increase or decrease*) in the equilibrium level of output and the equilibrium interest rate.
- An increase in government spending, G, shifts the IS curve to the _____ (hint: *left or right*) and leads to a _____ (hint: *increase or decrease*) in the equilibrium level of output and the equilibrium interest rate.

20-11_macro.pdf

This box is for the Examiner only.

Question:	1	2	3	4	5	6	Total
Points:	15	14	10	10	7	4	60
Score:							

Questions

1. **[IS-LM Model]**

   The IS relation is defined by the equation

   $$Y = C(Y - T) + I(Y, i) + G.$$

   The LM relation is defined by the equation

   $$\frac{M}{P} = YL(i).$$

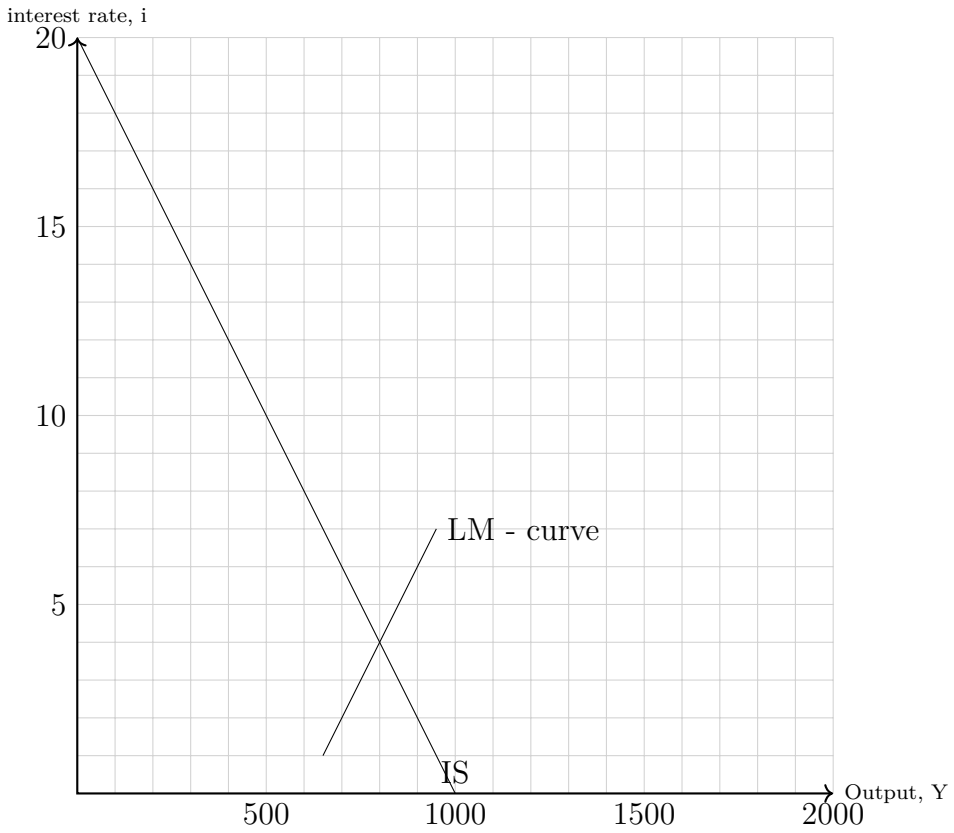
   Consider an economy described by the following equations:

   $$\begin{aligned} Y &= C + I + G \\ C &= 400 + 0.25(Y - T)) \\ I &= 300 + 0.25Y - 50i \\ G &= 50 \\ T &= 400 \end{aligned}$$

   (a) (6 points) Derive the IS curve.

Please turn over!

(b) (6 points) Draw the IS curve as derived in (a) into the plot below. Look on the intersection of the IS-curve with the LM-curve and state the equilibrium output and interest rate.



(c) (3 points) Fill in the gaps of the following text:

- A monetary expansion leads to _____ (hint: *higher or lower*) output and a _____ (hint: *higher or lower*) interest rate.
- An increase in taxes shifts the IS curve to the _____ (hint: *left or right*) and leads to a _____ (hint: *increase or decrease*) in the equilibrium level of output and the equilibrium interest rate.
- An increase in government spending, G, shifts the IS curve to the _____ (hint: *left or right*) and leads to a _____ (hint: *increase or decrease*) in the equilibrium level of output and the equilibrium interest rate.

2. [**Consumer Price Index (CPI)**]

(a) (5 points) Explain briefly the five steps to calculate the ***Consumer Price Index***.

(b) (9 points) The consumer price index (CPI) is an accurate measure of the selected goods that aim to be a representative bundle of goods, but it is not a perfect measure of the cost of living. Why? Explain three sources of bias.

3. [**European Central Bank**]

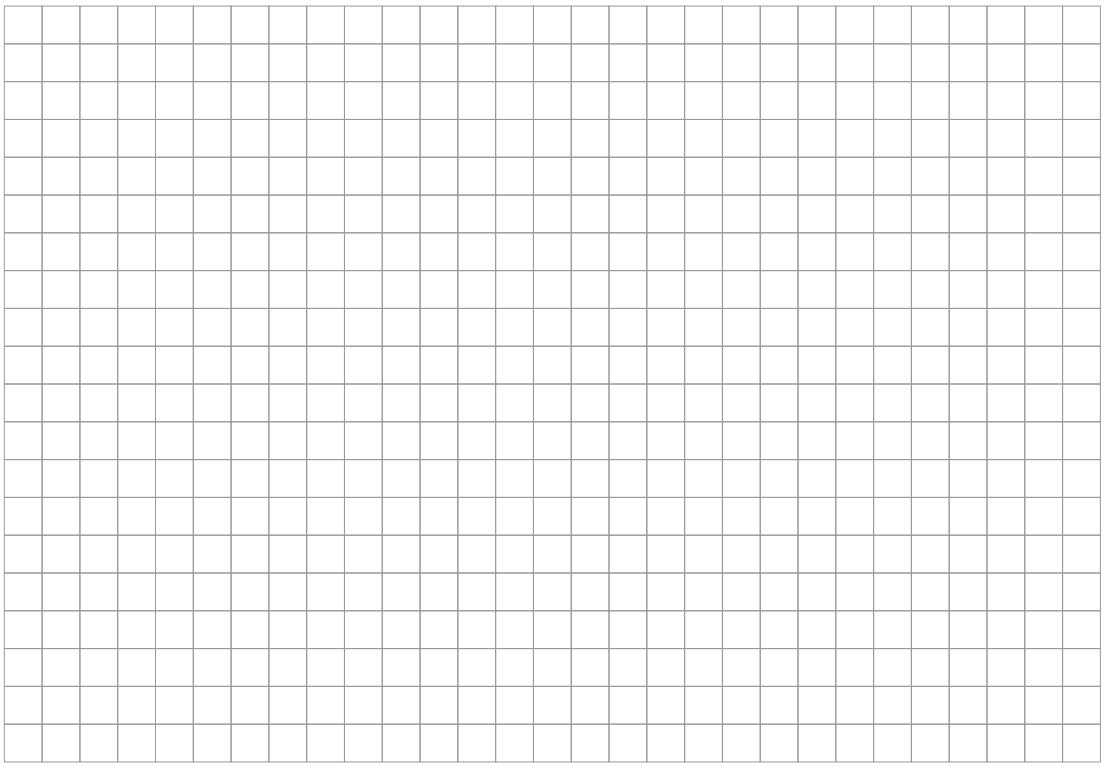
(a) (2 points) State the primary objective of the European Central Bank.

(b) (4 points) One of the most powerful instruments of central banks to influence prices are policy rates. In the lecture, we described four ways how the interest/policy rate policy of a Central bank can increase investments. Explain two of them.

(c) (4 points) Explain why the power of a further decrease in policy rates to stimulate an economy is limited once the rate is negative, i.e., below zero.

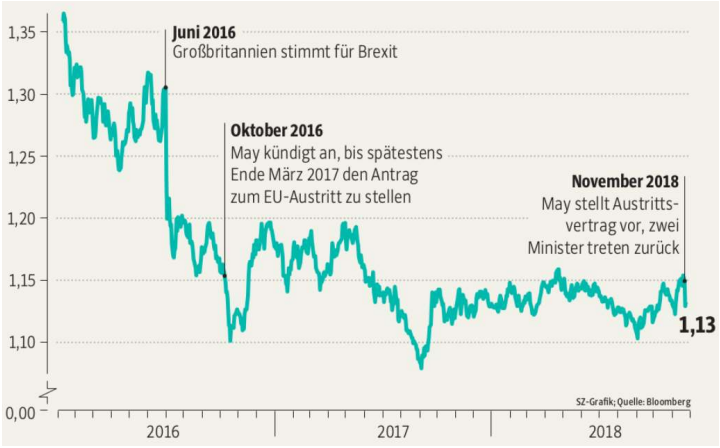
4. **[Unemployment]**

(a) (4 points) If nominal wages are downward rigid and above the market clearing level, involuntary unemployment exists. Sketch this scenario in a two-way graph. Please, don't forget to label axes and lines, respectively.



(b) (6 points) There are several rational explanations why wages are downward rigid and remain above the market clearing level. Explain the two sources that we discussed in class.

5. [**Foreign Exchange Market**]



(a) (3 points) The time series above shows the exchange rate of the British Pound Sterling (£). The y-axis is not labeled.

- State how the exchange rate is denoted here.
- Has the Pound appreciated or depreciated against the Euro since June 2015?

(b) (2 points) Suppose you have €100 and you want to exchange it into Swiss Franc. Calculate how much £ you receive for your €100 when the exchange rate is 0.92 denoted in Swiss Franc to Euro.

(c) (2 points) The Swiss central bank unpegged the Franc from the Euro in 2015. Referring to the interest parity condition, name the two major economic consequences without going into details.

6. (4 points) [**Measuring the Economy**] Define the disposable income and state the main difference to the gross domestic product (GDP).

21-01_macro_mock.pdf

This box is for the examiner only.

Question:	1	2	3	4	5	6	7	8	Total
Points:	14	10	8	15	10	10	7	4	78
Score:									

1. **[Measuring the Economy]**

An economy produces three goods: cars, computers, and oranges. Quantities and prices per unit for years 2005 and 2006 are as follows:

	2005		2006	
	Quantity	Price	Quantity	Price
Cars	10	$2000	12	$3000
Computers	4	$1000	6	$500
Oranges	1000	$1	1000	$1

(a) (2 points) What is nominal GDP in 2005 and in 2006? By what percentage does nominal GDP change from 2005 to 2006?

Solution: 2005 GDP: 10($2,000)+4($1,000)+1000($1)=$25,000
2006 GDP: 12($3,000)+6($500)+1000($1)=$40,000
Nominal GDP has increased by 60%.

(b) (2 points) Using the prices for 2005 as the set of common prices, what is real GDP in 2005 and in 2006? By what percentage does real GDP change from 2005 to 2006?

Solution: 2005 real (2005) GDP: $25,000
2006 real (2005) GDP: 12($2,000)+6($1,000)+1000($1)=$31,000
Real (2006) GDP has increased by 24%.

(c) (2 points) Using the prices for 2006 as the set of common prices, what is real GDP in 2005 and in 2006? By what percentage does real GDP change from 2005 to 2006?

Solution: 2006 real (2006) GDP: 10($3,000)+4($500)+1,000($1)=$33,000
2007 real (2006) GDP: $40,000.
Real (2006) GDP has increased by 21.2%.

(d) (2 points) Why are the two output growth rates constructed in (b) and (c) different? Which one is correct? Explain your answer.

Solution: The answers measure real GDP growth in different units. Neither answer is incorrect, just as measurement in inches is not more or less correct than measurement in centimeters.

Please go on to the next page...

(e) (2 points) Use the prices for 2005 as the set of common prices to compute real GDP in 2005 and in 2006. Compute the GDP deflator for 2005 and for 2006 and compute the rate of inflation from 2005 to 2006.

Solution: 2006 base year:
Deflator(2006)=1;
Deflator(2007)=$40,000/31{,}000$=1.29
Inflation=29

(f) (2 points) Use the prices for 2006 as the set of common prices to compute real GDP in 2005 and in 2006. Compute the GDP deflator for 2005 and for 2006 and compute the rate of inflation from 2005 to 2006.

Solution: 2007 base year:
Deflator(2005)=$25,000/33{,}000$=0.76;
Deflator(2006)=1
Inflation=(1-0.76)/0.76=.32=32%

(g) (2 points) Why are the two rates of inflation different? Which one is correct? Explain your answer.

Solution: Analogous to (d)

2. (10 points) **[Measuring the Economy]** Explain in detail the five steps to calculate the Consumer Price Index.

3. (8 points) **[Measuring the Economy]** Discuss why the nominal GDP is a bad predictor of well-beeing across countries. Can you imagine better alternatives?

4. **[Economies in the Short-Run]**

   (a) (6 points) Explain what we have discussed in class as the *Reverse Multiplier Effect*.

   (b) (4 points) Discuss briefly the level of unemployment when market are *perfect*.

   (c) (5 points) Explain the differences between *structural unemployment* and *frictional unemployment*.

5. **[European Central Bank]**

   (a) (2 points) State the primary objective of the European Central Bank.

   (b) (4 points) One of the most powerful instruments of central banks to influence prices are policy rates. In the lecture, we described four ways how the interest/policy rate policy of a Central bank can increase investments. Explain two of them.

Please go on to the next page...

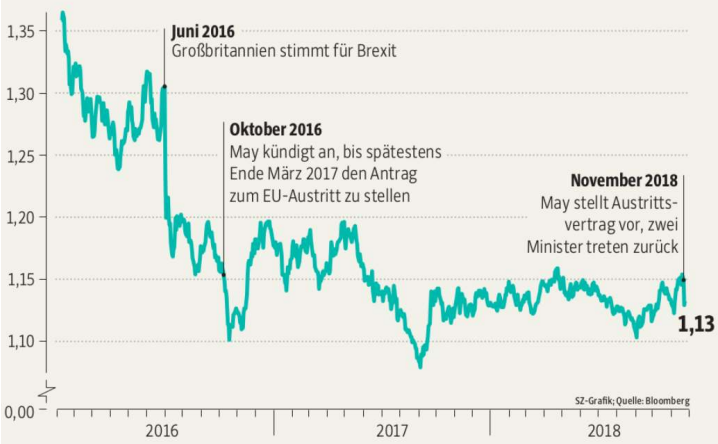
(c) (4 points) Explain why the power of a further decrease in policy rates to stimulate an economy is limited once the rate is negative, i.e., below zero.

6. **[Unemployment]**

(a) (4 points) If nominal wages are downward rigid and above the market clearing level, involuntary unemployment exists. Sketch this scenario in a two-way graph. Please, don't forget to label axes and lines, respectively.

(b) (6 points) There are several rational explanations why wages are downward rigid and remain above the market clearing level. Explain the two sources that we discussed in class.

7. **[Foreign Exchange Market]**



(a) (3 points) The time series above shows the exchange rate of the British Pound Sterling (£). The y-axis is not labeled.

- State how the exchange rate is denoted here.
- Has the Pound appreciated or depreciated against the Euro since June 2015?

(b) (2 points) Suppose you have €100 and you want to exchange it into Swiss Franc. Calculate how much Swiss Franc you receive for your €100 when the exchange rate is 0.92 denoted in Swiss Franc to Euro.

(c) (2 points) The Swiss central bank unpegged the Franc from the Euro in 2015. Referring to the interest parity condition, name the two major economic consequences without going into details.

8. (4 points) **[Measuring the Economy]** Define the disposable income and state the main difference to the gross domestic product (GDP).

End of exam

21-01_macro.pdf

This box is for the examiner only.

Question:	1	2	3	4	5	Total
Points:	6	11	18	9	16	60
Score:						

Questions

1. (6 points) **[Measuring the Economy (Part A)]**

   Discuss why the GDP per capita is only an imperfect measure for welfare and well-being.

2. [**Measuring the Economy (Part B)**]

Consider the following table of price and quantities produced for a small economy.

Year	Masks		Toilete Paper		Cinema Tickets		Wine		Grapes	
	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity
2019	€1	200	€2	100	10	10	3	30	1	15
2020	€1	1000	€2	100	10	0	2	40	1	20

(a) (4 points) Assume that all grapes in this economy are used to make wine. Compute nominal GDP for 2019 and 2020.

(b) (2 points) Calculate the percentage change in nominal GDP between 2019 and 2020.

(c) (2 points) Continue to assume that all grapes are used to make wine. Using 2019 as the base year, compute real GDP in 2019 and 2020.

(d) (2 points) Calculate the consumer price index (CPI) in 2019 and 2020, using 2019 as the base year.

(e) (1 point) What was the inflation rate in this economy between 2019 and 2020? Express your answer as a percentage.

3. **[Solow Model]**

Consider the Solow model of economic growth as introduced in the lecture. Assume the production function is

$$Y = K^{1/2}L^{1/2}$$

where Y is output, K is the capital stock, and L is the labor force. The labor force (assumed equal to the population) grows at a constant rate n. The capital stock depreciates at a constant rate δ. There is no exogenous technological progress ($g = 0.02$). The saving rate is s.

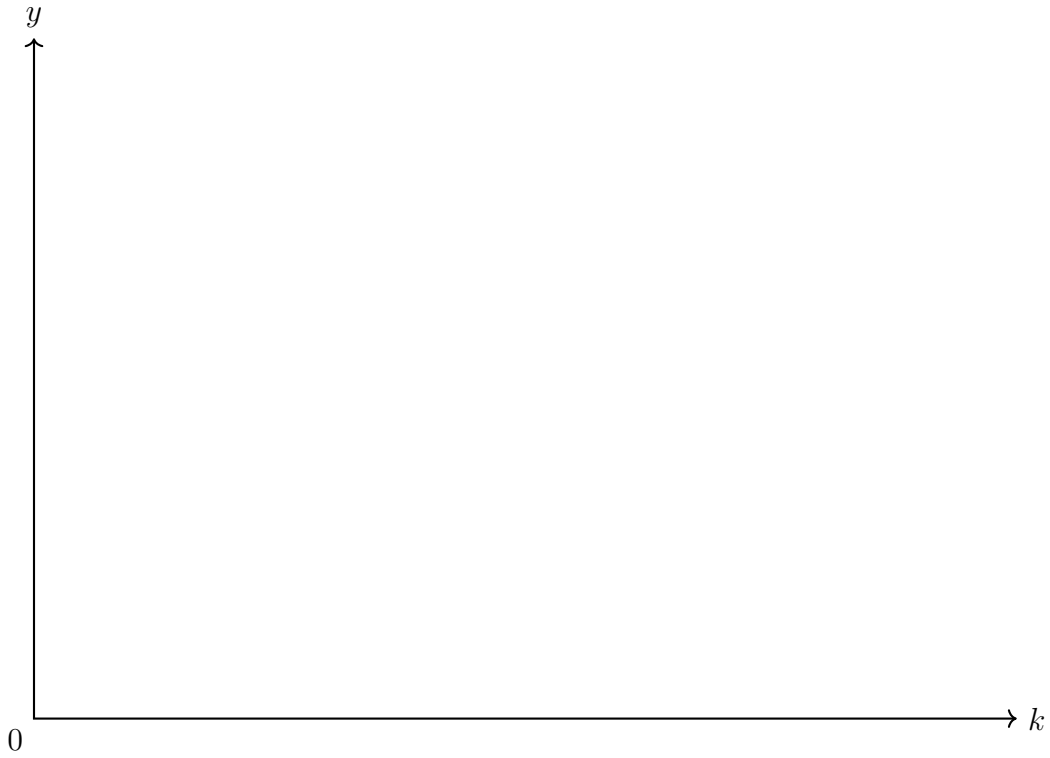
(a) (4 points) Show that the production function satisfies the assumption of the Solow model.

(b) (3 points) Write the production function in the intensive form, i.e, in output per effective unit of labor terms.

(c) (8 points) The dynamics of the capital stock per person are described by the equation

$$\dot{k} = sf(k) - (\delta - n)k.$$

Show how the steady-state stock of capital per worker is found using the diagram below and explain why the economy will converge to this point in the long run. Moreover, sketch in the figure the overall output per worker function, $f(k)$, and show how much of the overall output per worker goes to consumption.



(d) (1 point) Can a country increase its speed of economic growth in the short run by an increase of its saving rate?

- ◯ YES
- ◯ NO

(e) (1 point) Can a country increase its speed of economic growth in the long run by an increase of its saving rate?

- ◯ NO
- ◯ YES

(f) (1 point) What is the speed of economic growth for the countries of this model in the long run.

4. (9 points) [**Unemployment**]

In a *perfect labor market* no unemployment exists because wages adjust so that the quantity of labor supplied and the quantity of labor demanded would be equal. When the wage is above the equilibrium level the quantity of labor supplied exceeds the quantity of labor demanded and hence unemployment exists. Explain some reasons why the wage does not adjust downwards so that labor markets do not clear in equilibrium.

5. **[IS-LM Model]**

Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
Y &= C + I + G \\
C &= 400 + 0.25(Y - T) \\
I &= 300 + 0.25Y - 50i \\
G &= 500 \\
T &= 400 \\
\left(\frac{M}{P}\right)^d &= 2Y - 400i \\
\frac{M}{P} &= 600
\end{aligned}
$$

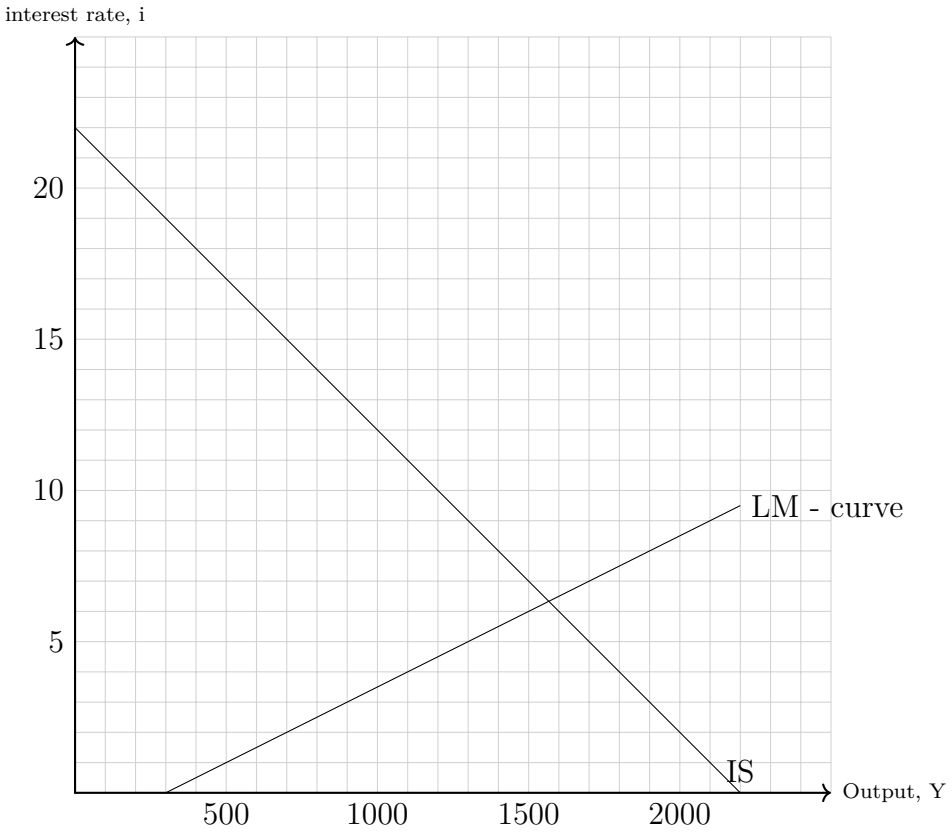
(a) (6 points) Derive the IS relation.

(b) (3 points) Derive the LM relation.

(c) (3 points) Solve for equilibrium real output.

(d) (2 points) Use the plot below to sketch graphically the impact of an increase in government spending on the IS-LM relations. Show the new equilibrium.

(e) (2 points) Use the plot below to sketch graphically the impact of a monetary expansion on the IS-LM relations. Show the new equilibrium.



21-04_macro.pdf

This box is for the examiner only.

Question:	1	2	3	4	Total
Points:	10	10	19	21	60
Score:					

Exam ©Prof. Dr. Stephan Huber, HS-Fresenius stephan.huber@hs-fresenius.de

Questions

1. **[Measuring the Economy]**

   (a) (5 points) The *GDP per capita* is a monetary measure of the market value of all the final goods and services produced in one year. Discuss why the *GDP per capita* is an imperfect measure for welfare and human well-being.

   (b) (5 points) State which of the following are a part of the *GDP* and which are not part of the *GDP*.

   A) Social security payments received by a retired factory worker.
   ◯ Part of GDP ◯ Not Part of GDP

   B) Unpaid services of a family member in painting the family home.
   ◯ Part of GDP ◯ Not Part of GDP

   C) The income of a butcher.
   ◯ Part of GDP ◯ Not Part of GDP

   D) The monthly allowance a college student receives from home.
   ◯ Part of GDP ◯ Not Part of GDP

   E) Rent received on an apartment.
   ◯ Part of GDP ◯ Not Part of GDP

   F) A €2 million increase in business inventories.
   ◯ Part of GDP ◯ Not Part of GDP

   G) Interest on a BMW bond.
   ◯ Part of GDP ◯ Not Part of GDP

   H) The purchase of an insurance policy.
   ◯ Part of GDP ◯ Not Part of GDP

2. **[Interest Rate Policy]**

   (a) (6 points) Explain briefly four ways and channels, respectively, on how interest rate policy can have a positive effect on investments.

(b) (4 points) Explain briefly why interest rate policy is less efficient in spurring investments when policy rates set by a central bank are already negative.

3. **[Solow Model]**

Consider the Solow model of economic growth as introduced in the lecture. Assume the production function is

$$Y = K^{1/2}L^{1/2}$$

where Y is output, K is the capital stock, and L is the labor force. The labor force (assumed equal to the population) grows at a constant rate n. The capital stock depreciates at a constant rate δ. There is no exogenous technological progress ($g = 0.02$). The saving rate is s.

(a) (5 points) Show that the production function satisfies the assumption of the Solow model.

(b) (3 points) Write the production function in the intensive form, i.e, in output per effective unit of labor terms.

(c) (8 points) The dynamics of the capital stock per person are described by the equation

$$\dot{k} = sf(k) - (\delta + n)k.$$

Sketch how the steady-state stock of capital per worker is found using a y-k diagram and explain why the economy will converge to this point in the long run. Moreover, sketch in the figure the overall output per worker function, $f(k)$, and show how much of the overall output per worker goes to consumption.

(d) (1 point) Can a country increase its speed of economic growth in the short run by an increase of its saving rate?

◯ YES

◯ NO

(e) (1 point) Can a country increase its speed of economic growth in the long run by an increase of its saving rate?

◯ NO

◯ YES

(f) (1 point) What is the speed of economic growth for the countries of this model in the long run.

4. **[IS-LM Model]**

Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
Y &= C + I + G \\
C &= 300 + 0.25(Y - T) \\
I &= 400 + 0.25Y - 50i \\
G &= 200 \\
T &= 200 \\
\left(\frac{M}{P}\right)^d &= 2Y - 200i \\
\frac{M}{P} &= 600
\end{aligned}
$$

(a) (8 points) Derive the IS relation.

(b) (3 points) Derive the LM relation.

(c) (4 points) Solve for equilibrium output, Y^*, and interest rate, i^*.

(d) (2 points) What would happen to the equilibrium real output, Y^*, and interest rate, i^*, if government would –all else equal– reduce the tax?

- ◯ i^* would increase
- ◯ i^* would decrease
- ◯ Y^* would increase
- ◯ Y^* would decrease

(e) (2 points) What would happen to the equilibrium real output, Y^*, and interest rate, i^*, if government would –all else equal– reduce the government spendings G?

- ◯ i^* would increase
- ◯ i^* would decrease
- ◯ Y^* would increase
- ◯ Y^* would decrease

(f) (2 points) What would happen to the equilibrium real output, Y^*, and interest rate, i^*, if the central bank would –all else equal– increase money supply, $\frac{M}{P}$?

- ◯ i^* would increase
- ◯ i^* would decrease
- ◯ Y^* would increase
- ◯ Y^* would decrease

22-07_macro.pdf

This box is for the examiner only.

Question:	1	2	3	4	5	6	7	Total
Points:	6	8	21	6	21	16	12	90
Score:								

1. (6 points) **[Balance of payments]** Explain why net exports must equal net capital outflows using the *formal representation*.

2. (8 points) **[Unemployment]** There are several rational explanations why wages are downward rigid and remain above the market clearing level. Explain two of the sources we discussed in class.

3. **[IS-LM Model: Equilibrium]** Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
C &= 400 + 0.2(Y - T) \\
I &= 200 + 0.4Y - 1000i \\
G &= 150 \\
T &= 200 \\
\left(\frac{M}{P}\right)^d &= 4Y - 8000i \qquad \rightarrow \text{[real money demand]} \\
\left(\frac{M}{P}\right)^s &= 1700 \qquad \rightarrow \text{[real money supply]}
\end{aligned}
$$

   Given the information above, please answer the following questions:

   (a) (7 points) Derive the IS curve.

   (b) (4 points) Derive the LM curve.

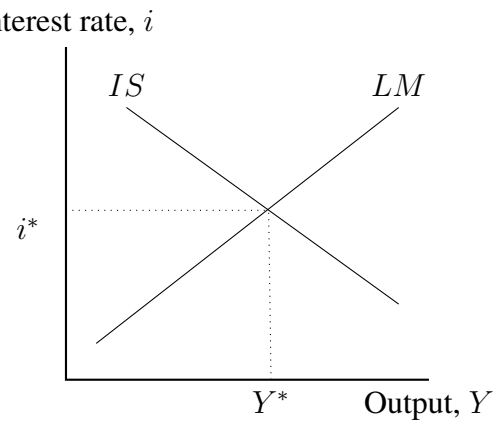
   (c) (4 points) Solve for the equilibrium output, Y^*.

   (d) (2 points) Solve for the equilibrium interest rate, i^*.

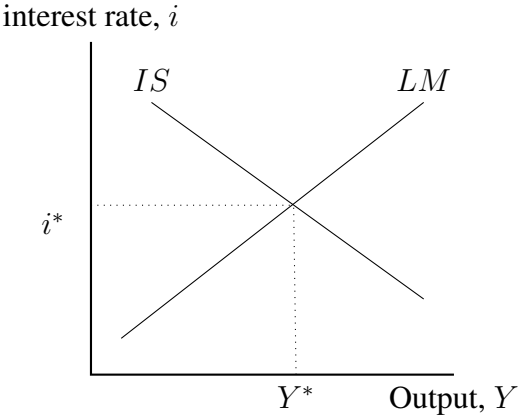
   (e) (4 points) Solve for the equilibrium consumption, C^*, and investment I^*.

4. **[IS-LM Model: The effects of fiscal and monetary policy]**

   (a) (3 points) Briefly sketch and discuss the implications of monetary expansion in the IS-LM model using the diagram below.



(b) (3 points) Briefly sketch and discuss the impact of an increase in taxes in the IS-LM model using the following diagram.



5. **[Measuring the Economy]**

(a) (8 points) Assume that two countries have the same nominal GDP (measured in the same currency and according to the same accounting rules). Explain why you cannot assume that citizens in both countries enjoy roughly the same level of economic well-being.

(b) (4 points) Discuss why it is not correct to estimate GDP by adding the value of all goods and services produced, both final goods and intermediate goods.

(c) (4 points) The average workweek has declined over the past 70 years and is currently about 35 hours a week. Discuss how this change has affected real GDP **and** well-being.

(d) (5 points) Explain briefly the five steps to calculate the Consumer Price Index.

6. **[Solow Model]**

Consider the Solow model of economic growth as introduced in the lecture. Assume the production function is

$$Y = K^{1/2}L^{1/2}$$

where Y is output, K is the capital stock, and L is the labor force. The labor force (assumed equal to the population) grows at a constant rate n. The capital stock depreciates at a constant rate δ. There is no exogenous technological progress $(g = 0)$. The saving rate is s.

(a) (5 points) Show that the production function satisfies the assumption of the Solow model.

(b) (3 points) Write the production function in the intensive form, i.e, in output per effective unit of labor terms.

(c) (8 points) The dynamics of the capital stock per person are described by the equation

$$\dot{k} = sf(k) - (\delta + n)k.$$

Sketch how the steady-state stock of capital per worker is found using a y-k diagram and explain why the economy will converge to this point in the long run. Moreover, sketch in the figure the overall output per worker function, $f(k)$, and show how much of the overall output per worker goes to consumption.

Please go on to the next page...

7. **[Interest Rate Policy]**

   (a) (2 points) State the primary objective of the European Central Bank.

   (b) (6 points) Explain briefly three ways and channels, respectively, on how interest rate policy can have a positive effect on investments.

   (c) (4 points) Explain briefly why interest rate policy is less efficient in spurring investments when policy rates set by a central bank are already negative.

End of exam

22-11_macro.pdf

This box is for the examiner only.

Question:	1	2	3	4	5	6	Total
Points:	9	6	26	8	12	29	90
Score:							

1. (9 points) **[Unemployment]** Explain three rational explanations why wages are downward rigid and remain above the market clearing level.

2. (6 points) **[Balance of payments]**

   The equation

   $$Y = C + I + G + EX - IM$$

   is often used to describe an open economy. Use this representation to explain why net exports must equal net capital outflows.

3. **[Inflation]**

   (a) (5 points) Explain how the inflation rate can be computed with the *consumer price index* (CPI) in five steps.

   (b) (6 points) Briefly explain three ways or channels through which the European Central Bank can have a negative impact on investment by raising policy rates.

   Solution: Basically, four ways exist how a reduced policy rate can spur investments:

   1. Banks can lend more to households and companies, rather than holding on to cash, which has now become costly.
   2. Businesses can invest more, as funding investment is now cheaper.
   3. Households could save less, or borrow to spend more.
   4. Demand for the currency could fall. This might lead to a depreciation of the currency, an increase in the price of imported goods and growing demand for the country's exports which are now cheaper for foreign buyers.

   (c) (7 points) Explain why central banks seek to keep inflation low. Discuss arguments why high inflation is bad for the economy and society.

   (d) (8 points) Explain the *Taylor rule*. In particular, write down and explain the formal expression of the rule.

4. (8 points) **[Reverse multiplier effect]** Explain what we meant in lecture by the phrase *reverse multiplier effect*. Discuss what governments or central banks can do to fight or mitigate the reverse multiplier effect.

5. (12 points) **[Measuring the Economy]**

   Explain what the GDP measures and discuss why it can only be considered as an imperfect measurement of well-being.

Please go on to the next page...

6. **[IS-LM Model: Equilibrium]** Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
C &= 600 + 0.2(Y - T) \\
I &= 300 + 0.4Y - 1000i \\
G &= 200 \\
T &= 100 \\
\left(\frac{M}{P}\right)^d &= 5Y - 5000i \qquad \rightarrow \text{[real money demand]} \\
\left(\frac{M}{P}\right)^s &= 1600 \qquad \rightarrow \text{[real money supply]}
\end{aligned}
$$

Given the information above, please answer the following questions:

(a) (7 points) Derive the IS curve.

(b) (4 points) Derive the LM curve.

(c) (4 points) Solve for the equilibrium output, Y^*.

(d) (2 points) Solve for the equilibrium interest rate, i^*.

(e) (4 points) Solve for the equilibrium consumption, C^*, and investment I^*.

(f) (8 points) Assume government decides to increase aggregate demand by increasing government spending by 21 so that $G = 221$. Show the implications of that expansive fiscal policy for the IS and the LM curve. Sketch the changes in a plot with the interest rate, i, and the Oputput, Y, on the axes. Explain what will happen to the equilibrium. Will aggregate output increase by more or less than 21? Justify your answer.

Please go on to the next page…

References

End of exam

23-01_macro.pdf

This box is for the examiner only.

Question:	1	2	3	4	5	Total
Points:	30	10	20	18	12	90
Score:						

1. **[IS-LM Model: Equilibrium]** Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
C &= 80 + 0.8(Y - T) \\
I &= 150 - 1000i \\
G &= 100 \\
T &= 100 \\
\left(\frac{M}{P}\right)^d &= 0.02Y - 1000i \qquad \rightarrow \text{[real money demand]} \\
\left(\frac{M}{P}\right)^s &= 50 \qquad \rightarrow \text{[real money supply]}
\end{aligned}
$$

   Given the information above, please answer the following questions:

   (a) (10 points) Derive the IS and the LM relation.

   (b) (10 points) Solve for

   - the equilibrium output, Y^*,
   - the equilibrium interest rate, i^*,
   - the equilibrium consumption, C^*, and
   - investment I^*.

   (c) (10 points) Assume government decides to increase aggregate demand by increasing government spending so that $G' = 200$.

   - Sketch the implications of that expansive fiscal policy for the IS and the LM curve in a plot with the interest rate, i, and the output, Y, on the axes.
   - Calculate
     - the equilibrium output, Y'^*,
     - the equilibrium interest rate, i'^*,
     - the equilibrium consumption, C'^*, and
     - investment I'^*.

2. (10 points) **[Keynes vs. Hayek]** Explain the Keynesian strategy to fight economic bust and boom cycles and discuss how the Austrian school including Friedrich Hayek think economies should deal with these cycles.

3. (20 points) **[Comparing the financial crisis to the Corona crisis]**

   Explain how the financial crisis of 2008/2009 differs from the Corona crisis. In particular, discuss gross domestic product, private consumption, the savings rate, government spending, corporate insolvencies, unemployment and the development of price levels.

Please go on to the next page...

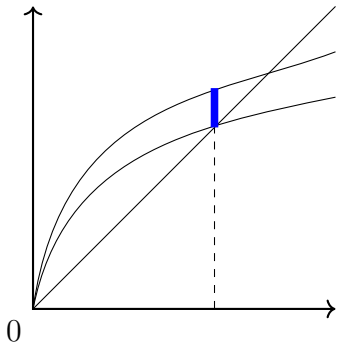
4. (18 points) **[Solow]**

   a) Discuss ways to boost economic growth under the Solow model.

   b) Explain what is meant by the term "steady-state equilibrium" in the Solow model.

   c) Explain the assumptions that guarantee the stability of the economic growth path in the Solow model.

   d) Label the axes and the functions of the figure below. Explain the three functions and the meaning of the blue and dashed lines.



5. (12 points) **[Measuring the Economy]** Explain the difficulties in measuring the consumer price index over time and discuss why it can only be considered an imperfect measure of the cost of living.

End of exam

23-04_macro.pdf

This box is for the examiner only.

Question:	1	2	3	Total
Points:	41	34	15	90
Score:				

1. **[Various]**

   (a) (4 points) Explain the difference of a positive and a normative statement in economics.

   (b) (5 points) Identify and explain plausible reasons why macroeconomists hold divergent views.

   (c) (6 points) The GDP is often used to indicate living standards. Identify and explain briefly alternative measures that can be used to evaluate the average living standards.

   (d) (6 points) Provide an explanation of the *simple rule for r* in international economics.

   (e) (6 points) Elaborate on the meaning and derivation of the equation $NCO = NEX$ as discussed in the lecture.

   (f) (6 points) Explain the concept of the "magic of the price system" as presented by Milton Friedman.

   (g) (8 points) Describe the Keynesian approach to managing economic bust and boom cycles. Moreover, discuss the potential long-term negative consequences of implementing this strategy.

2. **[IS-LM Model: Equilibrium]** Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
C &= 100 + 0.25(Y - T) \\
I &= 300 + 0.25Y - 50i \\
G &= 50 \\
T &= 10 \\
\left(\frac{M}{P}\right)^d &= 3Y - 200i \qquad \rightarrow \text{[real money demand]} \\
\left(\frac{M}{P}\right)^s &= 600 \qquad \rightarrow \text{[real money supply]}
\end{aligned}
$$

   Given the information above, please answer the following questions:

   (a) (10 points) Derive the IS and the LM relation.

   (b) (12 points) Solve for

   - the equilibrium output, Y^*,
   - the equilibrium interest rate, i^*,
   - the equilibrium consumption, C^*, and
   - investment I^*.

   (c) (12 points) One of the key concepts covered in this course was the IS-LM model and its applications to fiscal and monetary policy. As part of your preparation for the exam, you should be familiar with the table titled "The effects of fiscal and monetary policy

Please go on to the next page...

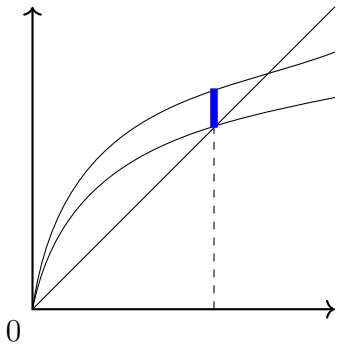
in the IS-LM model" found in the lecture notes. This table outlines the directional effects of various policy changes on key economic variables in the model. Please fill the gaps of the following table using the terms *left*, *right*, *none*, *down*, and *up*.

	Shift of IS	Shift of LM	Movement in Output	Movement in Interest Rate
Increase in taxes				
Decrease in taxes				
Increase in spending				
Decrease in spending				
Increase in money				
Decrease in money				

3. (15 points) **[Solow]**

   (a) Describe the key insights of the Solow Model and the policy implications of the Solow Model.

   (b) Label the axes and the functions of the figure below. Explain the three functions and the meaning of the blue and dashed lines.



End of exam

23-07_macro.pdf

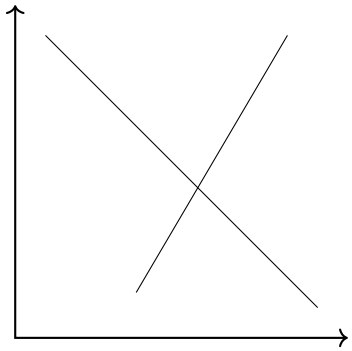
This box is for the examiner only.

Question:	1	2	3	Total
Points:	35	31	24	90
Score:				

1. (35 points) **[Unemployment]**

   Economists frequently employ a plot featuring two linear functions to depict the market equilibrium of full employment and unemployment, respectively.

   (a) Explain the concept of unemployment using the provided sketch. Label the axes and functions accurately and illustrate the situation in which the market fails to clear. Additionally, discuss the three rational explanations for the existence of unemployment that have been discussed in class.



   (b) Unemployment poses significant economic and social challenges at both the individual and societal levels. Discuss the individual costs associated with unemployment, as well as the economic and social costs that arise from high levels of unemployment.

   (c) Describe briefly the proposition of Okun's Law.

   (d) The *reverse multiplier effect* resulted in high unemployment levels during the Great Depression, which began in August 1929 after the economic expansion of the *Roaring Twenties* came to an abrupt halt. Explain the reverse multiplier effect briefly and discuss policy actions that can mitigate the effect.

2. **[Measuring the economy]**

   (a) (9 points) Provide an explanation of GDP, including how it is measured. Additionally, discuss briefly why GDP is just an imperfect welfare measure.

   (b) (12 points) Consider the following table of price and quantities produced for a small economy. Assume that only four goods (A, B, C) have been produced in the economy. B is an intermediate good that is used in the production of good C.

Year	A		B		C	
	Price	Quantity	Price	Quantity	Price	Quantity
2020	€1	2000	€2	100	€10	10
2021	€1	1800	€3	50	€10	20

   a) Calculate the nominal GDP for 2020 and 2021.

   b) Calculate the percentage change in nominal GDP between 2020 and 2021.

Please go on to the next page...

c) Calculate the consumer price index (CPI) in 2020 and 2021, using 2020 as the base year.

d) Calculate the real GDP for 2020 and 2021.

(c) (10 points) The consumer price index (CPI) is an accurate measure of the selected goods that aim to be a representative bundle of goods, but it is not a perfect measure of the cost of living. Why? Explain briefly the three sources of bias which we discussed in class.

3. **[IS-LM Model: Equilibrium]**

(a) (12 points) Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
C &= 10 + 0.8(Y - T) \\
I &= 1000 + 0.1Y - 0.05i \\
G &= 16 \\
T &= 4 \\
\left(\frac{M}{P}\right)^d &= 20Y - 2i \qquad \rightarrow \text{[real money demand]} \\
\left(\frac{M}{P}\right)^s &= 50 \qquad \rightarrow \text{[real money supply]}
\end{aligned}
$$

Given the information above, derive the IS relation and the LM relation. Then, solve for the equilibrium output, Y^*, the equilibrium interest rate, i^*, the equilibrium consumption, C^*, and investment I^*.

(b) (12 points) One of the key concepts covered in this course was the IS-LM model and its applications to fiscal and monetary policy. As part of your preparation for the exam, you should be familiar with the table titled "The effects of fiscal and monetary policy in the IS-LM model" found in the lecture notes. This table outlines the directional effects of various policy changes on key economic variables in the model. Please fill the gaps of the following table using the terms *left*, *right*, *none*, *down*, and *up*.

	Shift of IS	Shift of LM	Movement in Output	Movement in Interest Rate
Increase in taxes				
Decrease in taxes				
Increase in spending				
Decrease in spending				
Increase in money				
Decrease in money				

End of exam

23-11_macro.pdf

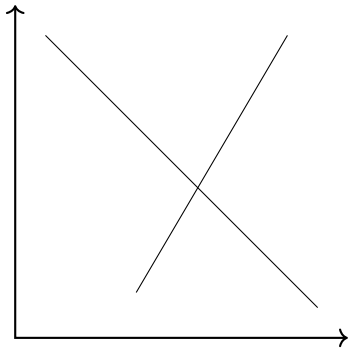
This box is for the examiner only.

Question:	1	2	3	4	5	6	7	Total
Points:	35	6	10	6	12	15	6	90
Score:								

1. (35 points) **[Unemployment]**

   Economists frequently employ a plot featuring two linear functions to depict the market equilibrium of full employment and unemployment, respectively.

   (a) Explain the concept of unemployment using the provided sketch. Label the axes and functions accurately and illustrate the situation in which the market fails to clear. Additionally, discuss the three rational explanations for the existence of unemployment that have been discussed in class.



   (b) Unemployment poses significant economic and social challenges at both the individual and societal levels. Discuss the individual costs associated with unemployment, as well as the economic and social costs that arise from high levels of unemployment.

   (c) Describe briefly the proposition of Okun's Law.

   (d) The *reverse multiplier effect* resulted in high unemployment levels during the Great Depression, which began in August 1929 after the economic expansion of the *Roaring Twenties* came to an abrupt halt. Explain the reverse multiplier effect briefly and discuss policy actions that can mitigate the effect.

2. (6 points) **[GDP]**

   The GDP per capita is a monetary measure of the market value of all the final goods and services produced in one year. Please elaborate on why nominal GDP per capita is an imperfect or unsuitable measure for conducting cross-country studies on economic prosperity.

3. (10 points) **[Consumer price index]** The consumer price index (CPI) is an accurate measure of the selected goods that aim to be a representative bundle of goods, but it is not a perfect measure of the cost of living. Why? Explain briefly the three sources of bias which we discussed in class.

4. (6 points) **[Balance of payments]** Explain briefly why net exports must equal net capital outflows using the *formal representation*.

Please go on to the next page...

5. (12 points) **[IS-LM Model: Equilibrium]**

   Consider an economy described by the following equations of the IS-LM model as discussed in the lecture:

$$
\begin{aligned}
C &= 100 + 0.2(Y - T) \\
I &= 300 + 0.1Y - 60i \\
G &= 90 \\
T &= 500 \\
\left(\frac{M}{P}\right)^d &= 20Y - 2i \qquad \rightarrow \text{[real money demand]} \\
\left(\frac{M}{P}\right)^s &= 50 \qquad \rightarrow \text{[real money supply]}
\end{aligned}
$$

   Given the information above, derive the IS relation and the LM relation. Then, solve for the equilibrium output, Y^*, the equilibrium interest rate, i^*, the equilibrium consumption, C^*, and investment I^*.

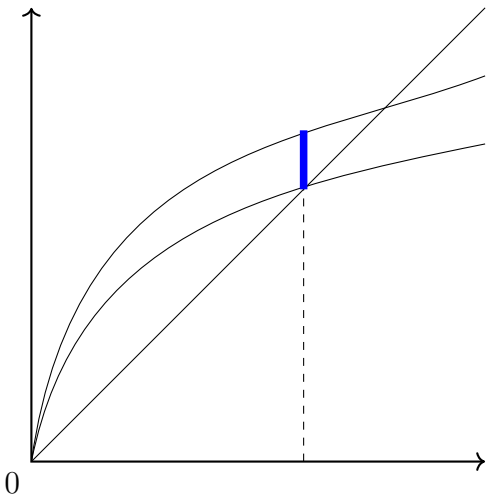
6. (15 points) **[Solow model]**

   a) Discuss ways to boost economic growth under the Solow model.

   b) Explain what is meant by the term *steady-state equilibrium* in the Solow model.

   c) Explain what is meant with the *golden rule of consumption* and at what point of the output function is consumption maximized.

   d) Label the axes and the functions of the figure below. Explain the three functions and the meaning of the blue and dashed lines.



7. (6 points) **[Exchange rates]**

   Suppose an investor from Indonesia asks for your help. The Indonesian investor wants to buy new inputs for his production in Indonesia next year, i.e., t=2024. Today, i.e., t=2023, she has 10,000,000 Indonesian Rupiah (IDR) and she wonders what to do with this money for one year. She has two potential investments in mind. One is an investement in Europe with 4% of annual interest and the other one is an investment in Indonesia that offers 16% of annual interest. Where should she invest given the following conditions:

   - One Euro can be converted to 15,000 IDR this year.
   - You expect that one Euro can be converted to 20,000 IDR next year.
   - Moreover, you expect no inflation in both countries and no banking fees or alike.

   Please complete the sentences:

   - The value of your investment in Indonesia in the year 2024 is

     _____ IDR.

   - The value of your investment in Europe in the year 2024 is

     _____ IDR.

End of exam

25-01_macro.pdf

This box is for the examiner only.

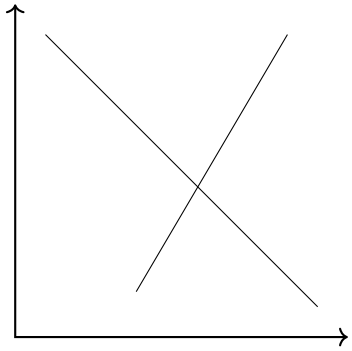
Question:	1	2	3	4	5	6	Total
Points:	15	27	6	10	17	15	90
Score:							

Macroeconomics (01/2025)

1. **[Unemployment]**

   Economists frequently employ a plot featuring two linear functions to depict the market equilibrium of full employment and unemployment, respectively.

   (a) (6 points) Explain briefly the concept of unemployment using the provided sketch. Label the axes and functions accurately and illustrate the situation in which the market fails to clear.



   (b) (9 points) Explain briefly the three rational explanations for the existence of unemployment that have been discussed in class.

2. **[IS-LM Model]**

   (a) (4 points) Explain what was referred to in the lecture as the *reverse multiplier effect*.

   (b) (10 points) Discuss measures that governments or central banks can implement to counteract or mitigate the *reverse multiplier effect*. In particular, refer to the IS-LM Model and identify the variables that can increase aggregate demand. For each variable, explain the necessary direction of change to boost aggregate demand.

   (c) (5 points) Briefly explain what is meant by the term *multiplier effect* in the context of the IS-LM model.

   (d) (8 points) Explain the Keynesian strategy and the Austrian school strategy for addressing economic boom and bust cycles. Discuss arguments that warn against excessive use of Keynesian policies due to their potentially adverse long-term consequences.

3. (6 points) **[Balance of payments]**

   In the lecture, we learned that "Net exports must equal net capital outflow". Briefly verify and explain this claim using the formal representation of an open economy.

4. (10 points) **[Inflation]**

   Central banks aim to keep inflation low because they are concerned about the negative effects that high inflation rates can have on an economy. Explain the specific negative effects

Please go on to the next page...

that central banks seek to avoid.

5. **[Measuring the Economy]**

   Suppose an economy consists of only three goods: Good A, B, and C. Good A, Good B, and Good D are final goods and Good C is an intermediate good. The sales and price data for these goods over two different years are provided below:

Good	A		B		C		D	
Year	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity
2023	€3	150	€3	80	€1	20	€4	10
2024	€3	120	€5	140	€2	16	€6	8

   (a) (6 points) Calculate the nominal GDP for both years.

   (b) (4 points) Calculate the real GDP for both years using 2023 as the base year.

   (c) (4 points) Calculate the Consumer Price Index for both years using 2023 as the base year.

   (d) (3 points) What was the inflation rate in this economy between 2019 and 2020? Express your answer as a percentage.

6. (15 points) **[Elective task: Choose Task A or Task B]**

   Please choose **one** out of the following **two** tasks to work on. If you complete more than one tasks, only task A will be evaluated. If you have started working on an task but have changed your mind, please cross out the task.

Task A: Fundamental causes of income difference

In the Handbook article by Acemoglu et al. (2005) which we discussed in class, three *fundamental causes of income differences* are explained. Name and describe these three causes, providing a detailed explanation for each.

Task B: Solow model

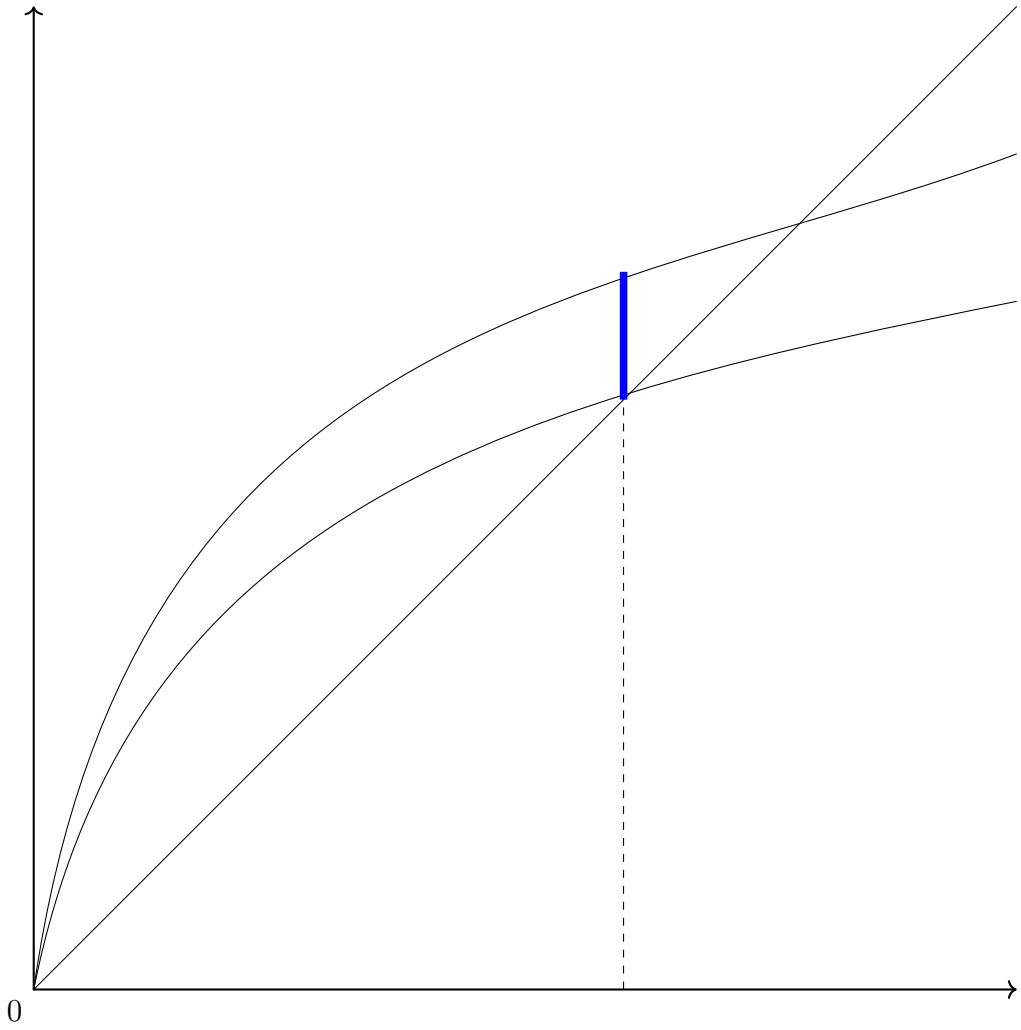
a) Discuss ways to boost economic growth under the Solow model.

b) Explain what is meant by the term *steady-state equilibrium* in the Solow model.

c) Label the axes and the functions of the figure below. Explain the three functions and the meaning of the blue and dashed lines.

d) Explain what is meant with the *golden rule of consumption* and at what point of the output function is consumption maximized.

Please go on to the next page…



References

Acemoglu, D., Johnson, S., and Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. In Aghion, P. and Durlauf, S. N., editors, Handbook of Economic Growth, volume 1A, chapter 6, pages 385–472. Elsevier.

End of exam