Universität U Siegen

Fakultät III
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Exam "Aggregate Economic Accounting Systems"
Winter Semester 2020-21
(1st Exam Period)

Solution

Available time: 90 minutes

For your attention:

1.   The exam is made up of 13 pages (including this cover page). Please check
      and see if the exam you are holding is **complete**.

2.   For your answers, use the designated spaces. Should these not suffice, use the
      backside of the pages. Please do not use a **pencil**.

3.   Additional materials you may use for the exam: a non-programmable calculator.
      (Smart phones and mobile **phones** are **not** allowed!)

4.   ATTENTION: The names for variables have the same meaning as in the
      lecture. Insofar as you also use the same symbols for the variables as we did in
      the lecture you will not have to define these any further.

Question	1	2	3	4	5	6	7	Sum	Mark
Points achievable	7	12	16	11.5	13.5	22	8		
Points achieved									

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Problem 1: Some Essential Macroeconomic Aggregates

The table below shows a series for GDP growth at current prices and the GDP deflator growth.

	2005	2006	2007
Growth Rate GDP (%)	2.5	1.6	0.9
Growth Rate Deflator (%)	2.8	1.1	2.2

GDP at current prices in 2005 was equal to 1,500,000 euros. For 2006, please calculate GDP in volume in millions of "2005 euros" precisely and approximately.

a) Precise calculation   [3.5 points]

Solution:

$$GDP_{2006}^{volume} = GDP_{2005} \cdot (1 + real\ growth\ GDP)$$

$$= GDP_{2005} \cdot \frac{1 + growth\ GDP\ at\ current\ prices}{1 + growth\ of\ deflator}$$

not required as part of solution

(0.5) (0.5)

$$1{,}500{,}000 \cdot \frac{1 + 0.016}{1 + 0.011} = 1{,}507{,}418$$

(0.5)   (0.5) (0.5)   (1)

b) Approximate calculation   [3.5 points]

Solution:

$$GDP_{2006}^{volume} = GDP_{2005} \cdot (1 + nominal\ growth\ GDP - growth\ deflator)$$

$$= 1{,}500{,}000 \cdot (1 + 0.016 - 0.011) = 1{,}507{,}500$$

(0.5)   (1)   (1)   (1)

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Problem 2: Distinguishing between Volume and Price Changes

Take the case of two types of wine, red and white: the following table shows the quantities sold in two periods at various prices.

	Period 1		Period 2	
	Quantity	Price	Quantity	Price
White wine	1,000	5.0	600	6.0
Red wine	200	10.0	600	12.0

a) For aggregate wine production, please calculate the index for the change in current prices.   [3 points]

$$\text{Solution:} \quad \frac{\overset{(0.5)}{600 \cdot 6.0} + \overset{(0.5)}{600 \cdot 12.0}}{\underset{(0.5)}{1,000 \cdot 5.0} + \underset{(0.5)}{200 \cdot 10.0}} = \frac{3,600 + 7,200}{5,000 + 2,000} = \frac{10,800}{7,000}$$

$$= 1.5428$$
$$(1)$$

b) Please calculate the Paasche price index for period 2.   [3 points]

$$\text{Solution:} \quad \frac{\overset{(0.5)}{600 \cdot 6.0} + \overset{(0.5)}{600 \cdot 12.0}}{\underset{(0.5)}{600 \cdot 5.0} + \underset{(0.5)}{600 \cdot 10.0}} = \frac{3,600 + 7,200}{3,000 + 6,000} = \frac{10,800}{9,000}$$

$$= 1.2000$$
$$(1)$$

c) Please calculate the Laspeyres volume index for period 2 by deflation.   [3 points]

(1)

Solution: $\dfrac{\mathbf{1.5428}}{\mathbf{1.200}}$ $= 1.2857$

(1)   (1)

d) Please check your result obtained in c) by calculating the Laspeyres volume index
   for period 2 prices directly from the table.   [3 points]

(0.5)   (0.5)

Solution: $\dfrac{600 \; \cdot \; 5.0 \; + \; 600 \; \cdot \; 10.0}{1{,}000 \; \cdot \; 5.0 \; + \; 200 \; \cdot \; 10.0} = \dfrac{3{,}000 + 6{,}000}{5{,}000 + 2{,}000} = \dfrac{9{,}000}{7{,}000}$

(0.5)   (0.5)

$= 1.2857$
(1)

Problem 3: International Comparisons

a) Please name two difficulties of international comparisons.   [3 points]

   Solution:

   - methods for calculating (or: estimating) variables (1)
     can differ between countries (0.5)

   - institutions (1)
     can differ between countries (0.5)

   - currencies (1)
     can differ between countries (0.5)

   - price levels (1)
     can differ between countries (0.5)

   ATTENTION: maximum 3 points!

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b) Saving ratios vary from country to country.

  b1 Please define the saving ratio (s).   [2 points]

    s =

    Solution: $s = \dfrac{\overset{(1)}{\text{saving}}}{\underset{(1)}{\text{disposable income}}}$

  b2 Usually, currencies vary from country to country. For example, Germany has the euro while Great Britain has the pound. Does this play a role for the comparison of national saving rates? Please carefully explain your answer.   [5 points]

    Solution:

  -    No! (1)

  -    both numerator and denominator are expressed in the national currency (2)

  -     division of numerator by denominator eliminates currency (2)

  b3 When it comes to calculating the saving ratio, some countries use a gross approach while others use a net approach.
    (i) What is the difference between the two approaches?
    (ii) Why does the net approach necessarily lead to a lower saving ratio than the gross approach?   [6 points]

    Solution:

      (i) gross approach includes consumption of fixed capital (CFC), net approach does not   (2)

      (ii) by deducting the same amount CFC from gross variables in numerator and denominator,   (2)
          net approach reduces numerator relatively more than it reduces denominator   (2)

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Problem 4: Calculation of Output: the Case of Distributors

The following are simplified data for a retail chain:

- Sales: 5,000
- Total purchases: 4,000 (of which, goods for resale: 3,900)
- Inventories of goods for resale at start of period: 100; at end of period: 200
- Inventories of materials at start of period: 50; at end of period: 70

Inflation is assumed to be negligible.

a) Please calculate output, intermediate consumption and value added. Assume that inflation is negligible.   [7.5 points]

Solution:

Output = distribution margin on products for resale
= sales – purchases of products resold
= sales – [purchases for resale – change in inventories of products for resale]

= 5,000 – [3,900 – 100] = 1,200

  (0.5) (0.5) (0.5) (0.5)   (1)

Intermed. consumpt.= purchases not for resale - change in inventories of materials

= [4,000 - 3,900] - [70 - 50]   : not necessary

= 100   - 20   = 80

     (1)   (1)   (1)

Value added = 1,200 - 80 = 1,120
              (0.5)   (0.5)   (0.5)

b) Suppose, that there had been inflation. Briefly indicate why this would have made the calculation more difficult.   [4 points]

   Solution: - change in inventories would include price changes (2)

              - these would have to be eliminated (2)

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Problem 5: Defining Final Uses of GDP

a) Final uses are defined in a general, abstract manner as goods and services that
   are <u>not</u> intermediate uses. What is meant by "intermediate" uses?   [2 points]

   Solution: goods and services …

                - … consumed (or: used up, or: transformed) (0.5)

                - … in production (0.5)

                - … within the country (0.5)

                - … during the accounting period (0.5)

b) In economic theory, final uses of GDP have a special name and are considered to
   be extremely important. Please briefly explain.   [2 points]

      Solution: - name: demand (0.5)

                    - relevance: determine growth (or: GDP) in the short run
                              (0.5)   (0.5)   (0.5)

c) The following tables show final uses of GDP for the United Kingdom (UK) and their
   price indices.

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Final uses, in billions of euros, at current prices

		2005	2006	2007
P31S14	Final consumption expenditure of households	946.12	986.59	1 030.45
P31S15	Final consumption expenditure of non-profit institutions serving households	31.57	33.44	35.48
P3S13	Final consumption expenditure of general government	408.15	421.74	435.65
P51	Gross fixed capital formation	332.32	360.38	394.62
P52	Changes in inventories	9.81	13.73	18.74
P53	Acquisitions less disposals of valuables	0.97	1.03	1.05
P6	Exports of goods and services	452.87	485.91	506.72
P7	Imports of goods and services	463.75	504.71	535.94
B1_GE	Gross domestic product (expenditure approach)	1 718.05	1 798.12	1 886.79

Prices indices of final uses (2005 = 100)

		2005	2006	2007
P31S14	Final consumption expenditure of households	100.00	102.02	104.13
P31S15	Final consumption expenditure of non-profit institutions serving households	100.00	103.69	105.63
P3S13	Final consumption expenditure of general government	100.00	101.92	103.72
P51	Gross fixed capital formation	100.00	104.32	107.43
P52	Changes in inventories	100.00	116.56	119.47
P53	Acquisitions less disposals of valuables	100.00	114.83	116.54
P6	Exports of goods and services	100.00	102.01	103.95
P7	Imports of goods and services	100.00	103.60	104.27
B1_GE	Gross domestic product (expenditure approach)	100.00	102.14	104.78

c1 What was gross fixed capital formation in volume (at 2005 prices) for 2005, what was it for 2006? [4 points]

Solution:

2005: 332.32 (0.5)

2006: $GFCF_{2006}^{vol} = GFCF_{2005}^{vol} \cdot (1 + growth_{GFCF_{2006}^{vol}})$

Not required

$$1 + growth_{GFCF_{2006}^{vol}} = \frac{\left(1 + growth_{GFCF_{2006}^{nominal}}\right)}{(1 + growth_{price_{2006}^{GFCF}})}$$

$$GFCF_{2006}^{vol} = 332.32 \cdot \left(1 + \frac{360.38/332.32}{104.32/100.00}\right) = 332.32 \cdot \frac{1.0844}{1.0432}$$

(0.5) (0.5) (0.5) (0.5) (0.5)

$$= 345.44 \quad (1)$$

c2 In 2006, final consumption expenditure of households in volume was 967.1. What was its contribution to growth of GDP in volume of 2006?

[5.5 points]

Solution: $\text{contribution} = \text{real growth rate} \cdot \text{share in GDP in 2005}$

$$= \underset{(1)}{\left(\frac{967.1}{946.12} - 1\right)} \cdot \underset{(1)}{\frac{946.12}{1{,}718.05}} = \underset{(1)}{0.0122} \text{ (or: } 1.22\,\%)$$

with points above: (1), (0.5), (1) over the first factor's numerator/denominator region.

Problem 6: Quadruple Entry

Household H is employed by corporation C, a private university.

a) For each of the following transactions, please make the quadruple entries of the transaction <u>amounts</u> in the accounts below. Next to the amounts, please also indicate the transaction numbers (1), (2) … Assume that all the household's economic relations are with the university and that all transactions run through bank accounts.

[10 points]

(1) H receives a salary of 50 000 from the university.

(2) One of H's children books a course at the university. H pays 5 000 for the course.

(3) H is one of the owners of the university. He sells back shares to the university in the amount of 10 000.

(4) Several years ago, H had given a credit to the university in the amount of 20 000. He agrees with the university to cancel 7 000.

(5) H agrees with the university to convert the remaining 13 000 of the credit into new shares of the university.

Household H
Non-financial transactions

Uses	Resources

University

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Non-financial transactions

Uses	Resources

Household H
Financial transactions

Change of assets	Change of liabilities

University
Financial transactions

Change of assets	Change of liabilities

Solution:

Household H
Non-financial transactions

Uses	Resources
(2a) 5 000 (0.5) (4b) Capital transfer 7 000 (0.5)	(1a) 50 000 (0.5)
	Dividend

University
Non-financial transactions

Uses	Resources
(1c) 50 000 (0.5)	(2c) 5 000 (0.5)
	(4d) Capital transfer 7 000 (0.5)
Dividend	
	Interest

Household H
Financial transactions

Change of assets	Change of liabilities
Bank account	
(1b) 50 000 (0.5)	
(2b) – 5 000 (0.5)	
(3b) 10 000 (0.5)	
Loans (4a) – 7 000 (0.5)	
(5b) – 13 000 (0.5)	
Shares (3a) - 10 000 (0.5)	
(5a) 13 000 (0.5)	

University
Financial transactions

Change of assets	Change of liabilities
Bank account	Shares (3c) - 10 000 (0.5)
(1d) – 50 000 (0.5)	Shares (5c) 13 000 (0.5)
(2d) 5 000 (0.5)	Loans (4c) – 7 000 (0.5)
(3d) - 10 000 (0.5)	(5d) – 13 000 (0.5)

b) What is the name of the balance of the non-financial account, what is the name of the balance of the financial account?   [4 points]

Solution: Net lending/net borrowing from non-financial account
                 (0.5)   (0.5)   (1)
                 Net lending/net borrowing from financial account
                 (0.5)   (0.5)   (1)

c) Purely financial transactions

c_1 Please characterize in general terms a purely financial transaction. [2 points]

Solution: does not change net lending/net borrowing
              (1)   (1)

or: is only recorded in financial account

or: does not lead to entries in non-financial account

c_2 Which types of purely financial transactions exist?   [4 points]

Solution:

(1) Asset change   (1)
(2) Liability change   (1)
(3) Simultaneous change of assets and liabilities (2)

c_3 Are there any purely financial transactions in a)? If so, please indicate their number (for example: transaction (4)).   [2 points]

Solution: (3) and (5)
              (1)   (1)

Problem 7: Balance Sheets

At the beginning of year t, the government issues a zero-coupon bond with a face value of EUR 1,000. The bond has a maturity of 5 years; the market rate at the beginning of year t is 3%.

a) What is the issue price if the bond is issued as a deep-discount bond at present value? Please show your calculation.   [3.5 points]

Solution: $1{,}000 / (1 + 0.03)^5$ =   862.61 (or: 862 or 863)
              (1)   (1)   (1)   (0.5)

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b) Please indicate the value at which the national accounts record this liability in the balance sheet of the government:

b$_1$ opening balance sheet of year t

b$_2$ closing balance sheet of year t

b$_3$ closing balance sheet of year t+5   [4.5 points]

   Solution:

   b$_1$ opening balance sheet of year t: 862   (1)

   b$_2$ closing balance sheet of year t: 862 + (1,000 – 862) / 5 = 862 + 27.6   = 890
                                        (0.5)   (1)   (1)   (0.5)

   b$_3$ closing balance sheet of year t+5: 1,000 (0.5)