

# Universität Siegen

Fakultät III  
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Exam "International Macroeconomics"  
Winter Semester 2016-17  
(1<sup>st</sup> Exam Period)

## Solution

Available time: 60 minutes

### For your attention:

1. The exam is made up of 9 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.

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Question	1	2	3	4	Sum	Mark
Points achievable	8.5	18	19	14.5	60	
Points achieved						

**Problem 1: International Economic Relations: Stocks and Flows**

- a) The changes of net foreign assets ( $B_{t+1} - B_t$ ) can not be explained completely by the balance of current-account transactions ( $CA_t$ ). Please say which other two variables have to be taken into account. [4 points]

**Solution:**

balance on capital account (or:  $KA_t$ )  
(0.5) (1)

Valuation changes of net foreign assets (or:  $VAL_t$ )  
(1) (0.5) (0.5) (0.5)

- b) The following table documents how the balance of payments of the euro area – i. e. of all countries who have adopted the Euro – has evolved from 2011 through 2013. All numbers are in billions of Euros.

	2011	2012	2013
<b>Current Account (credits – debits)</b>			
Goods	36.7	134.3	207.4
Services	45.6	55.4	67.0
Primary Income	50.0	62.9	45.2
Secondary Income	-124.9	-132.5	-141.5
<b>Balance</b>	7.2	119.9	178.1
<b>Capital Account Balance</b>	15.0	11.9	22.9
<b>Financial Account (net increase of assets – net increase of liabilities)</b>			
Direct Investment	108.5	6.5	-13.7
Portfolio Investment	-318.2	-40.1	-11.1
Financial Derivatives and ESOs	3.8	33.8	32.7
Other Investment	85.5	208.2	369.8
Reserve Assets	9.7	15.7	4.7
<b>Balance</b>	-110.8	224.1	409.9
<b>Net Errors and Omissions</b>	-133.0	92.4	208.8

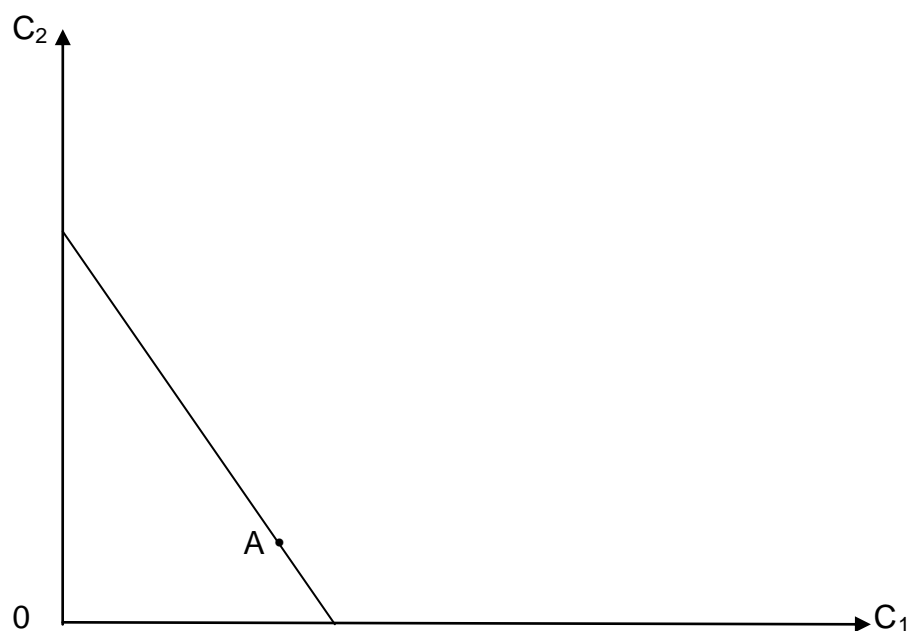
For which types of securities did Euro area assets increase more than liabilities in 2011 – 2013? [4.5 points]

**Solution:**

direct investment, financial derivatives and ESOs, other investment, reserve assets  
(1.5) (1) (1) (1)

**Problem 2: Representative Consumer in a Small Endowment Economy**

We consider an economy with exogenous incomes where the representative consumer has a two-period horizon. There is no initial international investment position ( $B_1 = 0$ ). In the following graph, A represents the endowment point.



a) Please briefly interpret the straight line.

[2 points]

**Solution:**

Intertemporal budget constraint (or: intertemporal consumption possibility curve)

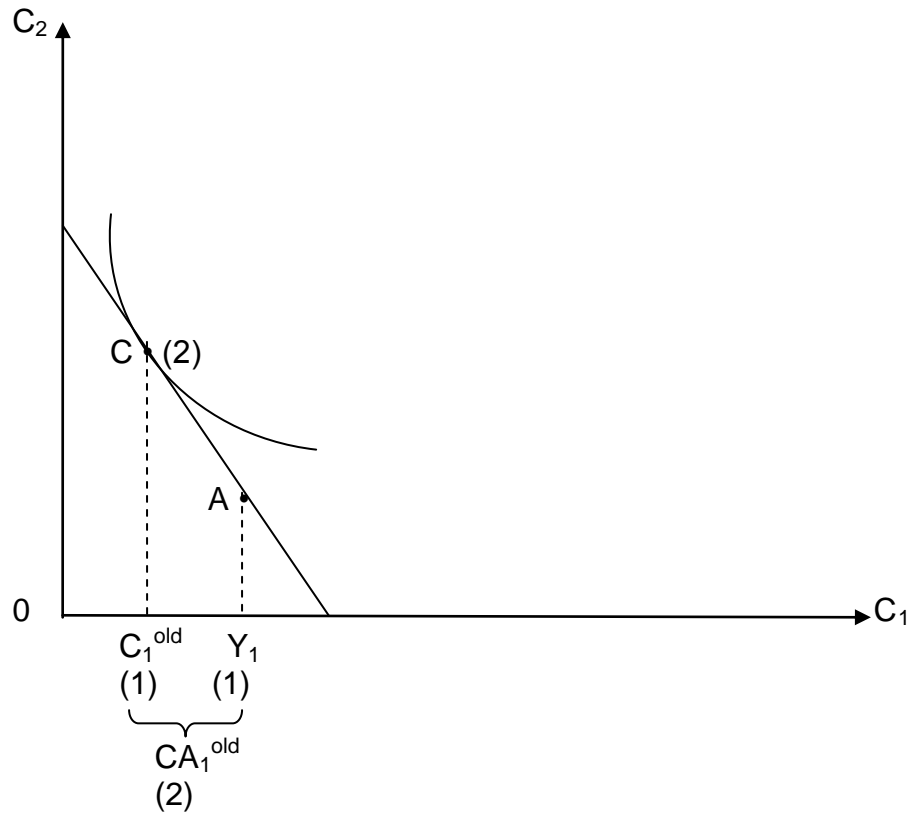
(1)

(1)

b) Please illustrate the optimal consumption point (C) such that the balance on current account is positive ( $CA_1 > 0$ ). On the horizontal axis, please indicate the following variables: income ( $Y_1$ ), Consumption ( $C_1^{old}$ ), current account balance ( $CA_1^{old}$ ).

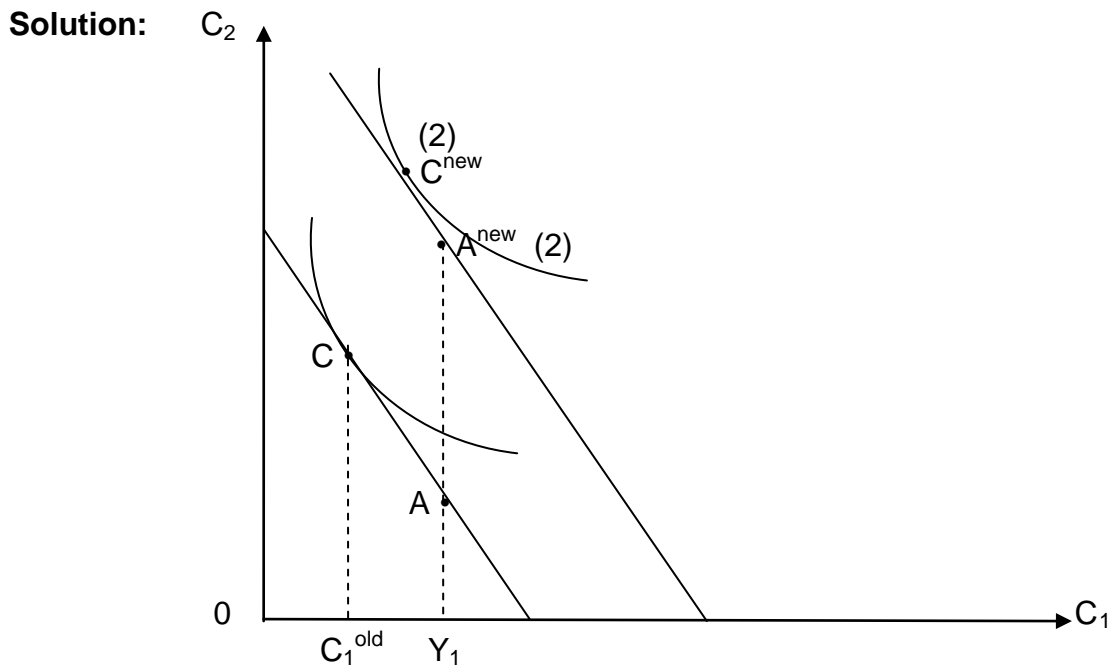
[6 points]

**Solution:**



c) Now, assume that income of the second period ( $Y_2$ ) is expected to increase.

$c_1$  In the above graph, please indicate the new endowment point as  $A^{new}$  and the new consumption point as  $C^{new}$ . [4 points]



c<sub>2</sub> Does the current account of the first period improve or deteriorate? Please explain. [3 points]

**Solution:**

deteriorate because the increase of  $Y_2$  leads to an increase of  $C_1$   
(1) (1) (1)

c<sub>3</sub> Does the international investment position at the end of the first period ( $B_2$ ) improve or deteriorate? Please explain. [3 points]

**Solution:**

- deteriorate (1)

- because of  $B_1 = 0$ , we have  $B_2 = CA$   
(1) (1)

(or: change of  $B_2$  equals change of  $CA_1$ )  
(1)

**Problem 3:**

Consider the following functions:

$$\text{I) } U_1 = \frac{C_1^{1-\sigma} - 1}{1-\sigma} + \beta \frac{C_2^{1-\sigma} - 1}{1-\sigma}$$

$$\text{II) } C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

a) Please briefly say what the two equations represent. [3 points]

**Solution:**

(I) Intertemporal (or: life-time) utility function  
(1) (0.5)

(I) Intertemporal (or: life-time) budget constraint  
(1) (0.5)

b) What does the left-hand side of equation (II) represent? [2 points]

**Solution:**

Present value of lifetime (or: two-period) consumption  
(1) (0.5) (0.5)

c) We want to calculate optimal consumption for both periods ( $C_1, C_2$ ).

c<sub>1</sub> Please formulate the Lagrange function. [4 points]

**Solution:**

$$Z = \frac{C_1^{1-\sigma} - 1}{1-\sigma} + \beta \frac{C_2^{1-\sigma} - 1}{1-\sigma} + \lambda \left[ Y_1 + \frac{Y_2}{1+r} - C_1 - \frac{C_2}{1+r} \right]$$

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

$c_2$  Among other things, the first-order conditions for optimal consumptions require the so-called Euler equation. Please derive that equation. [10 points]

**Solution:**

$$\frac{\partial Z}{\partial C_1} = \frac{(1 - \sigma) C_1^{-\sigma}}{1 - \sigma} - \lambda = 0$$

(1) (1) (0.5)

$$\frac{\partial Z}{\partial C_2} = \frac{\beta(1 - \sigma) C_2^{-\sigma}}{1 - \sigma} - \frac{\lambda}{1 + r} = 0$$

(1) (1) (0.5)

Solving both equations for  $\lambda$  and setting them equal leads to the Euler equation:

(1) (1)

$$\beta(1 + r) C_2^{-\sigma} = C_1^{-\sigma}$$

(1) (1) (1)

**Problem 4: Small Open Economy with Production**

The following equations describe a small open economy with production where the capital stock of the first period ( $K_1$ ) and the labour inputs of both periods ( $L_1, L_2$ ) are exogenous.

$$I) \quad r = A_2 F_K(K_2, L_2) - \delta$$

$$II) \quad u(C_1) = \beta(1+r)u(C_2)$$

$$III) \quad C_1 + \frac{C_2}{1+r} = A_1 F(K_1, L_1) - K_2 + (1-\delta)K_1 + \frac{A_2 F(K_2, L_2) + (1-\delta)K_2}{1+r}$$

$$IV) \quad B_2 = A_1 F(K_1, L_1) - C_1 - K_2 + (1-\delta)K_1$$

a) Please precisely say what the right-hand side of equation (I) shows. [2.5 points]

**Solution:**

Net marginal productivity of capital in the second period  
 (0.5) (0.5) (0.5) (0.5) (0.5)

(or instead of "net": less depreciation)

b) To which point in time do all variables in equation (III) refer? [2 points]

**Solution:** end of first period (or: beginning of second period) (2)

c) Suppose we would move back to autarky. For that case, please say in words which equation(s) would have to be eliminated and which equation(s) would have to be added. [4 points]

Eliminate:

Add:

**Solution:**

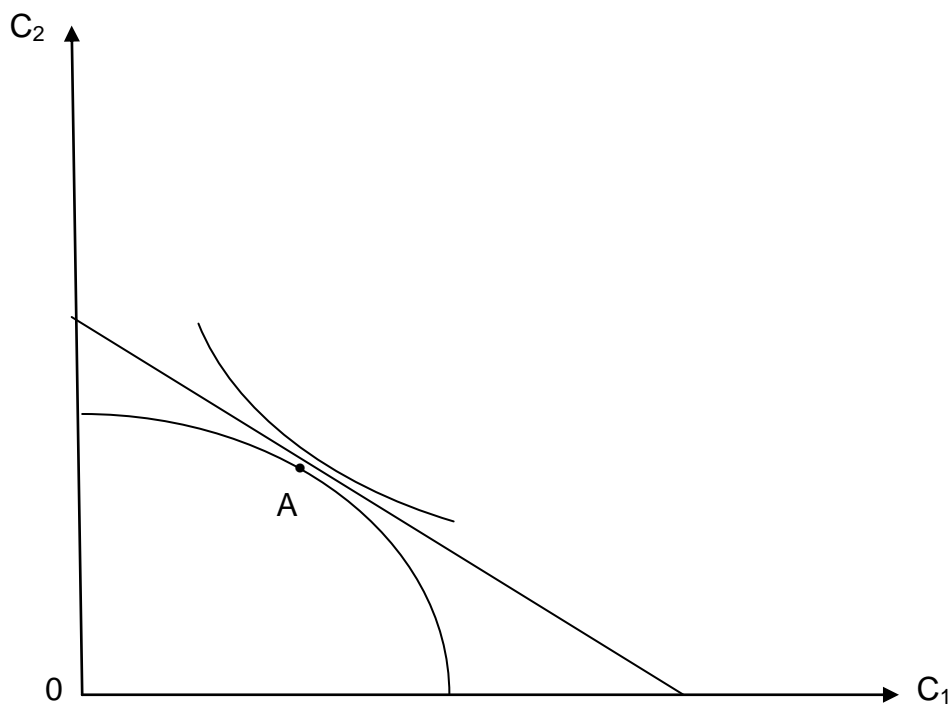
Eliminate (IV) (1)



Add: equilibrium conditions for the market of goods for both periods

(1) (1) (1)

- d) The following graph illustrates the autarky equilibrium in point A. Please illustrate the open-economy equilibrium for the case that the interest rate in the world market is higher than the domestic autarky rate. Denote the production point as P and the consumption point as C. [6 points]



**Solution:**

