

# Universität Siegen

Fakultät III  
Univ.-Prof. Dr. Jan Franke-Viebach

Exam "International Macroeconomics"  
Winter Semester 2017-18  
(2<sup>nd</sup> Exam Period)

## Solution

Available time: 60 minutes

### For your attention:

1. The exam is made up of 7 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	15	16	22	7	60	
Points achieved						

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

$$CA_t = (S_t^{priv} - I_t^{priv}) + (T_t - G_t)$$

- a) Using the equation, please explain the term "Twin Deficit". Please also give a numerical example. [5 points]

**Solution:**

Public deficit (or:  $T - G < 0$ ) and current account deficit (or:  $CA < 0$ )  
 (1) (1) (1)

Numerical example:  $CA_t = (S_t^{priv} - I_t^{priv}) + (T_t - G_t)$

$$-100 = 50 - 150$$

(1) (1)

- b) This relation has its merit as well as its shortcoming. Please briefly explain either the merit or the shortcoming. (No more than 20 words) [4 points]

**Solution:**

- merit:

- it is an identity (or: it always holds true) (2)
- it therefore must be respected in any model (or: statement) (2)

- shortcoming:

- it is an identity (or: it always holds true) (2)
- it does not explain anything (2)

- c) Please indicate how an open economy can use its private saving. You may do so by re-arranging the above equation in an appropriate way or by saying it in words. [6 points]

**Solution:**

$$S_t^{priv} = CA_t + I_t^{priv} + (G_t - T_t)$$

(1)                    (1)                    (1)                    (1)                    (1)

Or: private saving can be used to finance

investment in real capital, public deficit, investment abroad  
(1)                    (1)                    (1)                    (1)                    (1)                    (1)

**Problem 2:**

A representative consumer lives in a small open economy with a time horizon of 4 periods. The lifetime utility function is

$$U_1 = \sum_{s=1}^4 \beta^{s-1} \ln C_s, \quad \beta \in (0,1).$$

We furthermore assume :  $\beta(1+r) = 1$ ,  $B_1 = B_5 = 0$

- a) Please write down RC's budget constraint.

[6 points]

**Solution:**

$$\sum_{s=1}^4 \beta^{s-1} C_s = \sum_{s=1}^4 (\beta^{s-1} Y_s), \quad \beta \in (0,1)$$

(1)   (1)   (1)                    (1)   (1)   (1)

(instead of  $\beta$ ,  $1/(1+r)$  is accepted; instead of the summation sign  $\Sigma$ , they can write the various summands)

- b) The endowments are  $Y_1 = 1$ ,  $Y_2 = 3$ ,  $Y_3 = 1$ ,  $Y_4 = 1$ . Please derive RC's optimal consumption for each period. [10 points]

**Solution:**

Problem 2 b)

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$\beta(1+r) = 1 \Rightarrow$  smoothed consumption path. (2)

$\Rightarrow C_1 = C_2 = C_3 = C_4.$

So we factorise them, and since  $\beta \in (0, 1)$

$$\sum_{s=1}^4 \beta^{s-1} = \frac{1 - \beta^4}{1 - \beta} \quad (2)$$

The budget constraint becomes

$$\frac{1 - \beta^4}{1 - \beta} \cdot C = \sum_{s=1}^4 \beta^{s-1} \cdot Y_s \quad (2)$$

$$= \frac{1 - \beta^4}{1 - \beta} + 2\beta \quad (2)$$

(assume all 4 periods endowments are all equal to 1, and treat  $Y_2 = 3$  as an extra 2 unit end. at the 2. period, thus discount)

$$\Rightarrow C^* = 1 + \frac{2\beta(1-\beta)}{1-\beta^4} \quad (2)$$

**Problem 3: Two-Country Model with Production**

Consider the following functions for both Home (H) and Foreign (F):

$$U_1^c = u(C_1^c) + \beta^c u(C_2^c), \quad \beta^c = \frac{1}{1 + b^c}$$

$$Y_t^c = A_t^c F(K_t^c)$$

$$c = H, F ; \quad t = 1, 2$$

We assume the following rates of depreciation of capital:  $\delta^H = 0.1$ ,  $\delta^F = 0.22$  .

- a) The rate of time preference equals 0.20 in Home and 0.08 in Foreign. Please calculate the marginal rates of substitution for both Home and Foreign. Then, interpret the numerical value of the domestic marginal rate. [9 points]

**Solution:**

$$\text{rate of time preference} = \left| \frac{d C_2}{d C_1} \right| - 1 \quad (2)$$

$$MRS = \left| \frac{d C_2}{d C_1} \right| \quad (1)$$

Combining the two equations leads to:

$$MRS = \text{rate of time preference} + 1 \quad (1)$$

$$MRS^H = 1 + 0.20 = 1.20 \quad (1)$$

$$MRS^F = 1 + 0.08 = 1.08 \quad (1)$$

For one additional unit of  $C_1$ , domestic consumers are willing to give up 1.2 units of  $C_2$  .  
 (0.5) (0.5) (0.5) (0.5) (0.5) (0.5)

b) In autarky, which country has a higher marginal productivity of capital? Please show your calculation. [8 points]

**Solution:**

Equilibrium condition in autarky:

$$\text{rate of time preference} = A^c F^c - \delta^c \quad (2)$$

$$\text{Home: } A^H F_K^H = \text{rate of time preference} + \delta^H = 0.20 + 0.10 = 0.3 \quad (2)$$

$$\text{Foreign: } A^F F_K^F = \text{rate of time preference} + \delta^F = 0.08 + 0.22 = 0.3 \quad (2)$$

Both countries have the same marginal productivity (2)

c) In autarky, which country has a higher rate of interest? You may calculate the rate or derive it verbally. [5 points]

**Solution:**

$$\text{rate of time preference} = r^c \quad [\text{or } r^c = A^c F^c - \delta^c] \quad (2)$$

Home: 0.20 (1)	Foreign: 0.08 (1)	→ higher in Home (1)
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Or: rate must be equal to rate of time preference; that is higher in Home

#### **Problem 4: Two-Country Model**

Consider two countries of similar size. In the beginning, the net financial position of each country is zero.

- a) In autarky, the domestic country has a higher rate of interest than the foreign country. When both countries open their borders for international economic relations, how will the rate of interest change for Home? [2 points]

**Solution:** it will fall (2)

- b) Briefly say what will be the changes of the following variables in Home. (You do not have to explain your answer, just give one word per variable.) [5 points]

Consumption in first period

Investment in first period

Current account balance

Net international investment position

**Solution:**

Consumption in first period: increase (1)

Investment in first period: increase (1)

Current account balance: fall [or: negative] (1)

Net international investment position (2)