

Otto von Guericke Universität Magdeburg
Jun.-Prof. Dr. Dirk Bethmann

15 February 2013
20306 Macroeconomic Analysis
Winter 2012/13

Part I: /12
Part II: /68

Matrikelnummer/Student ID:
Nachname/Family name:
Vorname/First name:

Gesamtpunktzahl: / 80
Note:

Allowed auxiliary materials: Dictionary

Important hint:

This examination consists of **two parts**. **Both** parts (I and II) have to be answered.
Maximum points possible: 80 points.

Check, if you have all **ten** problem sheets. Follow the instructions to each problem.

Write your name and student ID number on this cover sheet. In case you also use separate double sheets for your answers, write your name on all answer sheets. Write legibly!

Good luck!

Part I: Multiple Choice

*You must answer Part I completely (12 exercises). There is only **one** correct answer for each exercise. You get **1** point for each correct answer. A maximum of **12 points** is attainable.*

1 Which of the following are characteristic roots of the stochastic difference equation:

$$y_t - y_{t-1} + y_{t-2} = \varepsilon_t?$$

- 0.5 ± 0.75
- $0.5 \pm i0.75$
- $0.5 \pm i\sqrt{0.75}$
- $0.5 \pm \sqrt{i0.75}$

2 A decrease in the money supply shifts the:

- AS curve to the right.
- AS curve to the left.
- AD curve to the right.
- AD curve to the left.

3 All of the following are stylized facts about prosperity and growth **except**:

- Growth rates can change, turning from high to low or vice versa.
- By growing, a country can move from being relatively poor to being relatively rich.
- The labor share stays relatively constant.
- The rate of return on capital and the wage rate grow at similar rates.

4 Consider a stochastic second order difference equation with roots $\lambda_1 = \frac{3}{5} + i\frac{3}{5}$ and $\lambda_2 = \frac{3}{5} - i\frac{3}{5}$. Which of the following statements about the fluctuations generated by this process is correct?

- Fluctuations are of the dampened variant.
- Fluctuations are of the explosive variant.
- Fluctuations are of the perpetual variant.
- Fluctuations cannot be characterized. More information is needed.

5 According to the q -theory, an increase in the ratio of stock prices to the acquisition cost of assets

- will discourage investment.
- will discourage consumption.
- will stimulate investment.
- will stimulate consumption.

6 The assumption that changes in the overall price level can temporarily mislead producers about relative prices helps us to explain:

- an upward sloped short-run aggregate supply curve.
- a downward sloped short-run aggregate supply curve.
- a vertical long-run aggregate supply curve.
- a horizontal long-run aggregate supply curve.

7 Consider a country in the Solow world without technological progress. Unfortunately, the country is hit by a devastating pandemic (e.g. the black death) that kills a third of its population. Before the pandemic, the country was in steady state. According to the principle of transition dynamics, we would expect the following:

- The country's income per worker is pushed out of the steady state and starts to shrink rapidly.
- The country's income per worker is pushed out of the steady state and starts to grow rapidly.
- The country's income per worker jumps to its new steady state level.
- The country's steady state level of income per worker remains unchanged.

8 Which of the following components is not included in the formula for the Taylor rule:

- The target inflation rate.
- The current inflation rate.
- The long-term interest rate.
- The output gap.

9 In the Lucas model, the slope of the aggregate supply curves does not depend on:

- the variance of relative prices.
- the elasticity of utility to labor input.
- the variance of the aggregate price level.
- the degree of wage rigidity in wage setting.

10 All of the following are stylized facts of the business cycle **except**:

- Employment fluctuations are anticyclical.
- Real money balances are procyclical.
- Investment fluctuations are procyclical.
- In general, a positive output gap lasts longer than a negative output gap.

11 The expectations-augmented Phillips curve will shift to the left:

- if there is an increase in the expected inflation rate.
- if there is a decrease in the expected inflation rate.
- if there is an increase in the natural rate of unemployment.
- if there is a decrease in the actual rate of unemployment.

12 If the inflation rate is below the target set by the central bank, the monetary policy reaction function suggests that the central bank will:

- increase the real interest rate above its normal level.
- decrease the real interest rate below its normal level.
- decrease the real goods supply.
- decrease the nominal money supply.

Part II:

*Answer **four** of the following five questions. If all five questions are answered only the first four will be graded. A maximum of **68 points** is attainable.*

1 Business cycles: introduction and stylized facts

- 1a Briefly define “business cycle” in your own words. (4 points)
- 1b Briefly explain how the time series of potential output and of the output gap are constructed from real GDP data. What role does HP filtering play in this context? (4 points)
- 1c Describe how the time series of aggregate consumption, investment, and government purchases behave over the business cycle. (3 points)
- 1d Briefly explain the “Frisch Slutsky paradigm” in your own words. (3 points)
- 1e Stochastic second order difference equations can generate processes that resemble a typical business cycle. Which criteria must the homogeneous solution to these equations satisfy for this to be the case? (3 points)

2 Newclassical economics

Consider the following newclassical model:

$$\begin{aligned}y_t &= m_t - p_t + \lambda_t & \lambda_t & \text{ is a mean 0, iid random variable} \\m_t &= \gamma_p p_{t-1} + \gamma_m m_{t-1} + \mu_t & \mu_t & \text{ is a mean 0, iid random variable} \\y_t &= b(p_t - p_t^e) + \nu_t, & b > 0 & \quad \nu_t \text{ is a mean 0, iid random variable}\end{aligned}$$

2a Explain briefly the model's equations! What does b represent in the Lucas Island model? What do λ_t , μ_t and ν_t represent? How should one think of β_p and β_m ? (6 points)

2b Solve the model, i.e. solve for y_t and p_t as functions of lagged values and the current disturbance ν_t , under:

i Static expectations (2 points)

$$p_t^e = p_{t-1}$$

ii Rational expectations (3 points)

$$p_t^e = \mathbb{E}[p_t | I_{t-1}], \quad I_{t-1} = \{m_{t-1}, \dots, y_{t-1}, \dots, p_{t-1}^e, \dots, p_{t-1}, \dots, \text{ and the model's parameters}\}$$

2c Does monetary policy have an effect on output? Why or why not? Does it have an effect on the price level? (3 points)

2d Discuss the role of λ , μ and ν . (3 points)

3 Trade unions and unemployment

Consider the following macro model of a unionized economy:

$$\begin{aligned}D(p_i) &= p_i^{-2}y, \\Y_i &= L_i \\ \Pi_i &= p_i Y_i - w_i L_i\end{aligned}$$

- 3a Briefly explain the model's equations. **(3 points)**
- 3b Assume that firms set prices and solve for the profit maximizing price of good i . Please check the first **and** second order conditions for a profit maximum. **(4 points)**
- 3c Use your result in (b) to derive $L^d(w_i)$, the labor demand function for sector i . **(2 points)**

Next, assume that the union maximizes the following objective function:

$$\Omega(w_i) = \frac{(w_i - \nu)L^d(w_i)}{N_i} + \nu$$

- 3d Briefly describe the economic intuition behind the union's objective function. **(1 point)**
- 3e Assume that the union sets wages. Which wage rate does the union set? **(2 points)**
- 3f What does ν represent? **(1 point)**
- 3g Use your results in (3b) and (3e) to determine the aggregate price setting and wage curves. Display the two curves graphically and briefly discuss your result. **(4 points)**

4 AS-AD model/Expectations-augmented Phillips curve

- 4a State and name the equations of the AS-AD model discussed in lecture (hint: do not refer to the compact version of the model, i.e. the version with only two equations). **(5 points)**
- 4b Briefly explain the model's variables. **(3 points)**
- 4c Explain the derivation of the expectations-augmented Phillips curve from a theory of wage and price setting (hint: no maths). **(6 points)**
- 4d Briefly describe in your own words how the short-run aggregate supply curve can be derived from the expectations-augmented Phillips curve. **(3 points)**

5 The general Solow model

Consider the following version of the general Solow model.

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha},$$

$$r_t = \alpha \left(\frac{A_t L_t}{K_t} \right)^{1-\alpha}$$

$$w_t = (1 - \alpha) \left(\frac{K_t}{A_t L_t} \right)^\alpha A_t$$

$$S_t = s Y_t$$

$$K_{t+1} = S_t + (1 - \delta) K_t, \quad K_0 \text{ given}$$

$$L_{t+1} = (1 + n) L_t, \quad L_0 \text{ given}$$

$$A_{t+1} = (1 + g) A_t, \quad A_0 \text{ given}$$

- 5a Briefly explain the model's equations. **(7 points)**
- 5b Define k_t and y_t as capital and output per effective worker determine the model's transition equation. **(4 points)**
- 5c Use your result in (b) to derive the steady state levels of k and y (b). **(3 points)**
- 5d Determine the Golden Rule saving rate? **(2 points)**
- 5e Discuss your answer in (d). **(1 point)**