

Otto von Guericke Universität Magdeburg
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20030 Macroeconomic Analysis I
Summer 2010

Part I: /12 Matrikelnummer/Student ID:

Part II: /64 Vorname/First name:

Gesamtpunktzahl: / 76
Note:

Allowed auxiliary materials: None

Important hint:

This examination consists of **two parts**. *Both* parts (I and II) have to be answered. Maximum points possible: 76 points.

Check, if you have all **fifteen** 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 $y_t - 0.7y_{t-1} + (0.35 \cdot 1.35)y_{t-2} = \varepsilon_t$?

- $-0.35 \pm i\sqrt{1.35}$
- $+0.35 \pm i\sqrt{1.35}$
- $-0.35 \pm i\sqrt{0.35}$
- $+0.35 \pm i\sqrt{0.35}$

2 With a standard money demand function where the interest sensitivity of money demand is not too high, the constant money growth rule implies that the nominal interest rate should vary

- negatively with the output gap.
- positively with the output gap.
- negatively with the deviation of inflation from the target money growth rate.
- positively but less than one-to-one with the deviation of inflation from the target money growth rate.

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

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

4 None of the following are stylized facts of the business cycle **except**:

- Real share prices are anticyclical and leading.
- Real share prices are anticyclical and lagging.
- Real share prices are procyclical and leading.
- Real share prices are procyclical and lagging.

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

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

6 Let the nominal interest rate in an economy be equal to 4 percent and the inflation rate be equal to 1 percent. What does the Fisher equation imply for the real interest rate?

- The real interest rate is equal to 5 percent.
- The real interest rate is equal to 3 percent.
- The real interest rate is equal to -3 percent.
- The real interest rate is equal to -5 percent.

7 Consider a poor country in the Solow world. The country is poor only because it has recently received a bad shock. However, its economic fundamentals are good. According to the principle of transition dynamics, we would expect the following:

- The country's income per person will shrink rapidly.
- The country's income per person will grow rapidly.
- The country's fundamentals will change rapidly.
- Nothing will happen.

8 When a nation has a very low GDP per capita,

- it must be a very small nation.
- it will be poor forever.
- investments in capital will likely have a big impact on output.
- it would be better to withdraw investments.

9 Which of the following statements about the solution to the trade union model is correct?

- The resulting unemployment is voluntary at the individual level.
- The resulting unemployment is involuntary from the collective long-run perspective of all union members.
- Trade unions face the "cartel problem" because unemployed workers have an incentive to undercut wages.
- Firm profits depend positively on the monetized value of the real unemployment benefit (b).

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

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

11 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.

12 Which of the following statements best describes “Ricardian equivalence”?

- Private households internalise the government’s budget constraint such that the timing of tax changes does not affect consumption decisions.
- Consumption decisions made by private households are driven not by the current income level but by lifetime income expectations.
- The net utility gain from postponing one unit of consumption from the current to the next period is zero.
- The present value of current and future tax revenues must cover the present value of current and future government spending plus the initial debt.

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 **64 points** is attainable.

1 Consider the following version of the AS AD model.

$$\pi_t = \pi_t^e + \gamma (y_t - \bar{y}_t) + s_t, \quad \gamma > 0, \quad (\text{AS})$$

$$\pi_t = \pi_t^* - \frac{1}{\alpha} (y_t - \bar{y}_t) + \frac{1}{\alpha} z_t, \quad \frac{1}{\alpha} > 0. \quad (\text{AD})$$

1a Briefly explain the model's equations. Which variables are endogenous? **(6 points)**

1b Explain where the AS and AD curves come from. Hint: Do not forget to discuss the roles of monetary policy and marginal productivity of labor when explaining the slopes of the two curves. **(4 points)**

.. to be continued

Now assume that the target inflation rate equals the current monetary growth rate (μ) and that agents have static expectations such that the expected rate of inflation equals last period's inflation rate.

1c Show that y can be expressed as a reduced form univariate process (i.e. without the presence of π).
(3 points)

1d Is the process in (1c) stable? **(1 point)**

1e Can the process in (1c) replicate the statistical properties of the business cycle? Why or why not?**(2 points)**

2 Business cycles: introduction and stylized facts.

2a Briefly explain “business cycle” in your own words. (4 points).

2b Briefly explain how the constructed time series of potential output and of the output gap from real GDP data. What role does HP filtering play in this context? (4 points).

2c Consider the national income identity of a closed economy ($Y_t = C_t + I_t + G_t$) and describe the behavior of aggregate consumption, investment, and government purchases over the business cycle. (3 points).

.. to be continued

2d Give three examples of macroeconomic variables that are leading indicators of aggregate income. Please, also state how these indicators correlate with the business cycle. **(3 points)**.

2e Stochastic second order difference equations can replicate business cycle movements. Which criteria must the characteristic roots of the difference equation satisfy for this to be the case? **(2 points)**.

3 Consider a representative agent who lives two periods (present and future). Her problem of maximizing lifetime utility is given by:

$$U(C_0, C_1) = \sum_{t=0}^1 \beta^t u(C_t) = \ln C_0 + \beta \ln C_1, \quad (3.1)$$

where $u(C) = \ln C$ is a time separable and invariant utility function and the parameter β is the subjective discount factor. The problem is subject to the sequence of constraints:

$$V_{t+1} = (1+r)(V_t + Y_t^L - T_t - C_t), \quad t \in \{0, 1\}, \quad (3.2)$$

where V_t denotes the predetermined stock of real financial wealth in period t . C_t denotes the consumption level of the representative agent in period t . The agent decides whether she wants to consume her resources or whether she wants to keep them for future consumption. In addition to the sequence of budget constraints we consider an initial condition

$$V_0 > 0 \quad (3.3)$$

and an ending condition

$$V_2 = 0 \quad (3.4)$$

telling us that on the one hand it is economically not sensible to waste capital and on the other hand it is not allowed to be in debt at the end of the last period.

3a Use the sequence of constraints (3.2) to derive an intertemporal budget constraint where the present value of lifetime consumption is on one side and the present value of lifetime disposable income plus the initial financial wealth on the other. **(4 points)**.

3b Solve for the first order necessary condition along an optimal consumption path. Hint: Solve the intertemporal budget constraint for C_1 and substitute the result into the objective function such that you obtain an unconstrained optimization problem in the choice of C_0 . **(4 points)**.

.. to be continued

3c Use your result in (3b) to state the Keynes-Ramsey rule in your own words. **(3 points)**.

3d Show that the optimal consumption path is given by: **(4 points)**.

$$C_0^* = \frac{1}{1+\beta} \left(V_0 + Y_0^L - T_0 + \frac{Y_1^L - T_1}{1+r} \right) \quad \text{and} \quad C_1^* = \frac{(1+r)\beta}{1+\beta} \left(V_0 + Y_0^L - T_0 + \frac{Y_1^L - T_1}{1+r} \right) \quad (3.5)$$

3e What is the effect of an increase of the interest rate on the consumption pattern? **(1 point)**.

4 Consider the following model of stock prices:

$$(r + \epsilon)V_t = D_t^e + V_{t+1}^e - V_t, \quad (4.1)$$

$$\lim_{n \rightarrow \infty} \frac{V_{t+n}^e}{(1 + r + \epsilon)^n} = 0 \quad (4.2)$$

4a Briefly explain the model's equations. (2 points)

4b Show that the model implies: (2 points)

$$V_t = \sum_{k=0}^{\infty} \frac{D_{t+k}^e}{(1 + r + \epsilon)^{k+1}} \quad (4.3)$$

4c Interpret your result in (4b). (2 points)

.. to be continued

Now assume that the following relationships hold:

$$D_t^e = \Pi_t^e - I_t - \frac{a}{2}I_t^2, \quad (4.4)$$

$$V_{t+1}^e = q_t(K_t + I_t) \quad (4.5)$$

4d Briefly explain equations (4.4) and (4.5). What does q_t represent? **(3 points)**

4e Determine optimal investment as a function of q . **(3 points)**

4f Briefly state the q -theory of business investment in your own words. **(4 points)**

5 In lecture, we discussed the hypotheses of absolute and relative convergence.

5a Briefly explain the hypothesis of absolute convergence. **(4 points)**

5b Briefly explain the hypothesis of relative convergence. **(4 points)**

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In the general Solow model, the rate of convergence to steady state is approximately $(1 - \alpha)(n + g + \delta)$.
5c How well does the general Solow model perform when it is confronted with real-world cross country data? **(4 points)**

In the general Solow model, exogenously given technological progress generates economic growth, even in steady state.

5d Discuss the contribution of the general Solow model to the attempt to explain the trend in main economic time series. **(4 points)**