Макроэкономика 1 — МИЭФ, 2024 midterm

МИЭФ | Макроэкономика 1 | 2024 | midterm

SECTION 1

A. Multiple-choice questions — 30 marks

Choose **one** correct answer for each question. Each question is worth **6 marks**. No explanation is required and there is no penalty for a wrong answer.

1

An economy described by the Solow model is on its balanced growth path. Technology grows at rate $g > 0$. Population is shrinking, with growth rate $n = -g < 0$. What is the growth rate of saving per capita?

- (a) 0
- (b) $-n$
- (c) n
- (d) $-2n$

2

An economy described by the Solow growth model without technical progress experiences a sudden increase in the capital-depreciation rate. What will be the immediate effect on consumption per worker?

- (a) No effect
- (b) Negative
- (c) Positive
- (d) Ambiguous

3

Define the crowding-out effect (COE) as a decrease in output that occurs when rising public-sector spending drives down private-sector investment. Assume that the central bank has an output-stabilisation goal and increases the real interest rate when the output gap is positive. How will the COE change if the central bank becomes more aggressive in pursuing its goal?

- (a) The COE will not change

- (b) The COE will decrease
- (c) The COE will increase
- (d) The change will be ambiguous

4

The Taylor principle implies that the central bank should adjust the nominal interest rate in response to lower inflation in the following way:

- (a) Decrease it exactly one-for-one
- (b) Increase it more than one-for-one
- (c) Decrease it more than one-for-one
- (d) Increase it exactly one-for-one

5

What is the current long-run neutral real interest rate in Russia according to the Bank of Russia estimates for 2024?

- (a) $-1.0–0\%$
- (b) $0–1.0\%$
- (c) $1.0–2.0\%$
- (d) $2.0–3.0\%$

SECTION 2

C. Problem — 90 marks, including 20 bonus marks

In a closed economy, capital owners earn a fraction θ of national income. Profits are normalised to zero, so the remaining share $(1-\theta)$ is earned by workers. Capital and labour incomes are both taxed at a unified rate τ. The marginal propensity to consume of workers is greater than that of capitalists:

$$0 < c_1^c < c_1^w < 1.$$

Investment demand is

$$I(r) = I_0 - br,$$

where $b > 0$. The budget is **not** balanced, so government purchases are exogenously fixed at G_0. The central bank flexibly targets inflation π^* by setting the real interest rate according to

$$r = r^* + \alpha(\pi - \pi^*).$$

The short-run aggregate supply function is

$$\pi = \pi^e + \lambda(Y - Y_n),$$

where $\lambda > 0$, π and π^e are current and expected inflation, and $Y - Y_n$ is the output gap.

Initially, the output gap is zero, $r = r^*$ and the economy is at $\pi_0 = \pi^*$. Due to structural changes, the share θ of national income earned by capitalists increases.

(a) (10 marks) Derive the algebraic expression for the aggregate-demand schedule in $\pi(Y)$ space. Explain intuitively in two or three sentences why and how the slope

$$\left.\frac{d\pi}{dY}\right|_{AD}$$

changes when θ increases.

(b) (10 marks) Assume that initially, in period 1, people have static inflation expectations:

$$\pi_1^e = \pi_0^e = \pi_0.$$

Illustrate in the four-quadrant $IS - rr - 45^\circ - AD - SAS$ diagram the effect of higher θ on output, the real interest rate and inflation. Label all curves accurately so that the diagram is self-explanatory. Denote the medium-run equilibrium in $\pi(Y)$ space as (Y_1, π_1).

(c) (10 marks) Suppose that in period 2 half of economic agents start negotiating future wages in line with observed past inflation π_1, so $\pi_2^e = \pi_1$. For the remaining half, inflation expectations remain static, so $\pi_2^e = \pi_0$. Illustrate in the same four-quadrant diagram the new equilibrium (Y_2, π_2) and denote the new real interest rate r_2 in both the IS and rr schedules.

(d) (10 marks) Now consider a neoclassical environment in which economic agents have rational forward-looking expectations and all prices, including nominal wages, are fully flexible. Assume that people do not expect any change in monetary policy after the shock to θ and their inflation expectations are **not anchored**. Illustrate the ultimate equilibrium (Y_3, π_3) in a separate $IS - rr - 45^\circ - AD - LRAS$ diagram. Carefully label all curves and explain the adjustment process in three or four sentences.

(e) (10 marks) Explain in three or four sentences how the central bank can anchor inflation expectations. Illustrate the difference between anchored and non-anchored inflation expectations in the diagram from (d). Will the composition of output change after the shock to θ if $\pi^e = \pi^*$?

Finally, consider the very-long-run consequences of a greater capital-income share. Output is produced according to

$$Y = K^{\theta} L^{1-\theta},$$

where K is physical capital, which depreciates at rate δ, and employment L grows at rate n. The supply side is described by the Solow model, and a constant share s of after-tax income is used for gross capital accumulation.

(f) (10 marks) Derive the capital-formation equation in per-capita terms and illustrate the steady-state solutions for

$$k \equiv \frac{K}{L}, \qquad y \equiv \frac{Y}{L}$$

in the Solow diagram.

(g) (10 marks) Sketch the transition paths of $\ln y$ after a positive shock to θ.

(h) (10 marks) What would be the dynamics of APK and MPK after a positive shock to θ?

(i) (10 marks) Will strict inflation targeting at π^* be consistent in the very long run?