

MACROECONOMICS 2026

SHANGHAI JIAO TONG UNIVERSITY

SUMMER SCHOOL 2026

QUIZ 3

Reading time: 10 minutes. **Writing time:** 60 minutes.

Total marks: 100. **Calculators are permitted.**

Instructions: Answer **all** questions. In Section A, circle the letter of the single best answer. In Sections B and C, show your working and write in clear sentences.

Structure:

- **Section A** — Multiple choice: 20 questions, 2.5 marks each (**50 marks**).
- **Section B** — One analytical problem in five parts (**30 marks**).
- **Section C** — One short interpretation (**20 marks**).

Useful formulas. Short-run output $\tilde{Y}_t = \frac{Y_t - \bar{Y}_t}{\bar{Y}_t} \times 100$; IS curve $\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$, with $\bar{a} = \bar{a}_c + \bar{a}_i + \bar{a}_g + \bar{a}_{ex} - \bar{a}_{im} - 1$; investment share $\frac{I_t}{\bar{Y}_t} = \bar{a}_i - \bar{b}(R_t - \bar{r})$; Fisher $i_t = R_t + \pi_t$ (so $R_t = i_t - \pi_t$); Phillips curve $\pi_t = \pi_{t-1} + \bar{v}\tilde{Y}_t + \bar{o}$, change form $\Delta\pi_t = \bar{v}\tilde{Y}_t + \bar{o}$, adaptive expectations $\pi_t^e = \pi_{t-1}$.

Section A: Multiple Choice

(20 questions $\times$ 2.5 marks = 50 marks)

1. Which statement about potential output $\bar{Y}_t$ in the short-run model is correct?
 - (A) It is the maximum output the economy could produce if every input were pushed to its physical limit.
 - (B) It is simply the level of output reached at the most recent business-cycle peak.
 - (C) It is determined inside the short-run model, jointly with current output.
 - (D) It is the output produced with inputs at their long-run sustainable levels, taken as given by the short-run model.
2. Potential output is $\bar{Y} = 500$ and actual output is $Y = 480$. Short-run output (the output gap) is:
 - (A) -20% , and the economy is in a recession.
 - (B) $+4\%$, and the economy is in a boom.
 - (C) -4% , and the economy is in a recession.
 - (D) -4% , and the economy is in a boom.
3. In the short-run model, short-run output $\tilde{Y}_t$ is:
 - (A) the gap between actual and potential output, written as a percentage of potential output.
 - (B) the level difference $Y_t - \bar{Y}_t$, measured in dollars.
 - (C) always positive, because actual output cannot fall below potential.
 - (D) the same thing as the long-run inflation rate $\bar{\pi}$.
4. The short-run model rests on three premises. Which of the following is one of them?
 - (A) The economy is almost never disturbed by shocks of any macroeconomic importance.
 - (B) Potential output is determined inside the short-run model.
 - (C) Monetary and fiscal policy cannot affect output, even in the short run.
 - (D) There is a dynamic trade-off between output and inflation, described by the Phillips curve.

5. In the IS setup $Y_t = C_t + I_t + G_t + EX_t - IM_t$, consumption, government purchases, exports and imports are each written as a share of potential output. Which component is modelled as depending on the real interest rate?

- (A) Consumption.
- (B) Government purchases.
- (C) Investment.
- (D) Exports.

6. Because $C_t = \bar{a}_c \bar{Y}_t$ depends on potential output (a smooth trend), the model implies that:

- (A) consumption is smoother than actual GDP; in a recession households keep spending steady by drawing on savings, as in the permanent-income hypothesis.
- (B) consumption is more volatile than actual GDP over the business cycle.
- (C) consumption falls one-for-one with actual output during a recession.
- (D) consumption depends mainly on the real interest rate.

7. In the investment equation $I_t/\bar{Y}_t = \bar{a}_i - \bar{b}(R_t - \bar{r})$, investment is high when:

- (A) the real interest rate R_t is well above the marginal product of capital $\bar{r}$.
- (B) the demand parameter $\bar{a}_i$ is zero.
- (C) inflation is above its long-run rate.
- (D) the marginal product of capital $\bar{r}$ is above the real interest rate R_t .

8. In the IS curve $\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$, the parameter $\bar{a}$:

- (A) is the slope of the IS curve.
- (B) combines the demand shares, equals zero in the long run, and is pushed away from zero by shocks; it is the aggregate demand shock.
- (C) is the marginal product of capital.
- (D) is the real interest rate the central bank sets.

9. On the IS curve $\tilde{Y} = \bar{a} - \bar{b}(R - \bar{r})$ with $\bar{a} = 0$ and $\bar{b} = 0.4$, the central bank sets the real rate three points above $\bar{r}$, so $R - \bar{r} = +3$. The output gap is:

- (A) $\tilde{Y} = -1.2\%$.
- (B) $\tilde{Y} = +1.2\%$.
- (C) $\tilde{Y} = -7.5\%$.
- (D) $\tilde{Y} = -3\%$.

10. Which of the following moves the economy *along* a fixed IS curve, rather than shifting the curve?

- (A) A collapse in consumer confidence that lowers the demand parameter $\bar{a}$.
- (B) A change in the real interest rate set by the central bank.
- (C) An investment boom that raises $\bar{a}_i$.
- (D) A boom abroad that raises exports.

11. A higher value of the parameter $\bar{b}$ means:

- (A) investment is more sensitive to the interest rate, so the IS curve is flatter and a given rate change moves output more.
- (B) the IS curve is steeper.
- (C) $\bar{b}$ shifts the IS curve rather than changing its slope.
- (D) a given change in the interest rate moves output by less.

12. With the central bank holding $R = \bar{r}$, an investment boom raises the investment share $\bar{a}_i$ by 2 percentage points. Short-run output:

- (A) is unchanged, because the central bank keeps $R = \bar{r}$.
- (B) rises by $2\bar{b}$ percentage points.
- (C) rises 2 percentage points above potential.
- (D) falls 2 percentage points below potential.

13. In the short-run model, the bursting of the housing bubble in 2008 is best described as:

- (A) a positive demand shock that shifts the IS curve outward.
- (B) a fall in the demand parameter $\bar{a}$ that shifts the IS curve back, pushing output below potential, to which the central bank responds by cutting the interest rate.

- (C) a price shock $\bar{o}$ that shifts the Phillips curve up.
- (D) a movement along the IS curve caused by the central bank raising rates.

14. In the IS-MP diagram, the MP curve is:

- (A) an upward-sloping line in output and the interest rate.
- (B) the same line as the IS curve.
- (C) a vertical line at potential output.
- (D) a horizontal line at the real interest rate the central bank chooses.

15. The central bank moves the *nominal* rate i , yet in the short run the course says it controls the *real* rate R . The reason is:

- (A) by the Fisher equation $R = i - \pi$, and inflation is sticky in the short run, so a change in i passes through to R .
- (B) the central bank sets the real interest rate directly by legal decree.
- (C) inflation adjusts instantly and one-for-one with any change in the nominal rate.
- (D) real and nominal interest rates are unrelated at short horizons.

16. The central bank raises its interest rate. In the short-run model, the result is:

- (A) output rises, because higher rates attract more investment.
- (B) nothing happens, because monetary policy is neutral in the short run.
- (C) the real rate rises above the marginal product of capital, investment falls, and output drops below potential.
- (D) inflation rises immediately, because prices are fully flexible.

17. Inflation last year was $\pi_{t-1} = 4\%$. The Phillips curve is $\Delta\pi_t = \bar{v} \tilde{Y}_t$ with $\bar{v} = 0.5$, there is no supply shock, and the economy runs a gap of $\tilde{Y} = -2\%$ this year. Inflation this year is:

- (A) 4%.
- (B) 5%.
- (C) 2%.
- (D) 3%.

18. Under adaptive expectations, $\pi_t^e = \pi_{t-1}$. This means:

- (A) firms perfectly foresee next year's inflation.
- (B) firms expect this year's inflation to equal last year's, so expectations adjust slowly and inflation is sticky.
- (C) expected inflation always equals the central bank's target.
- (D) expected inflation equals the size of the current oil shock $\bar{o}$.

19. An economy runs a sustained *positive* output gap, year after year (no price shocks). According to the Phillips curve $\Delta\pi_t = \bar{v} \tilde{Y}_t$, inflation:

- (A) rises once to a higher level and then stays constant at that level.
- (B) stays at its initial level for as long as the gap does not change.
- (C) rises year after year, never settling at any new level.
- (D) drifts slowly back to its long-run rate as expectations adjust.

20. Inflation is 2% and the economy stays at potential ($\tilde{Y} = 0$) throughout. A one-year supply shock $\bar{o} = +4$ hits (then returns to zero), and expectations are adaptive ($\pi_t^e = \pi_{t-1}$). Two years after the shock, inflation is:

- (A) 2%.
- (B) 6%.
- (C) 4%.
- (D) 10%.

Section B: Analytical Problem (30 marks)

Consider one economy. Its IS curve is $\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$ with interest sensitivity $\bar{b} = 0.5$ and marginal product of capital $\bar{r} = 3\%$. Its Phillips curve is $\pi_t = \pi_{t-1} + \bar{v}\tilde{Y}_t + \bar{o}$ with slope $\bar{v} = 0.5$ and adaptive expectations ($\pi_t^e = \pi_{t-1}$). The Fisher equation is $i_t = R_t + \pi_t$. The economy starts at potential ($\tilde{Y} = 0$) with inflation at $\pi = 2\%$, no shocks, and $R = \bar{r}$.

- (a) **[6 marks]** A housing-bubble collapse destroys confidence: a demand shock $\bar{a} = -2$ hits while the central bank holds $R = \bar{r}$. Find the output gap $\tilde{Y}$. State which way the IS curve shifts and whether this is a boom or a recession.
- (b) **[6 marks]** The central bank now wants to offset the shock fully and return output to potential ($\tilde{Y} = 0$). By how much, and in which direction, must it move the real rate? State $(R - \bar{r})$ and R itself, and use the Fisher equation to check that the implied nominal rate $i = R + \pi$ is feasible (not below zero), with $\pi = 2\%$.
- (c) **[6 marks]** Suppose instead the central bank had left $R = \bar{r}$, so the gap from part (a) lasted one full year (with no price shock). Use the Phillips curve to find $\Delta\pi$ and the new level of inflation.
- (d) **[6 marks]** Now start again from potential ($\tilde{Y} = 0$, $\pi = 2\%$). A one-year oil price shock $\bar{o} = +4$ hits and then returns to zero, and output stays at potential throughout. Using adaptive expectations, find inflation in the shock year and inflation two years after the shock.
- (e) **[6 marks]** Return to the demand shock of part (a). Suppose this economy instead had $\bar{b} = 1.0$. Explain how the IS curve and the required policy response differ, and compute the $(R - \bar{r})$ needed to offset the same shock $\bar{a} = -2$.

Section C: Interpretation (20 marks)

Read the following and answer in **no more than five sentences**. Use the concepts from the short-run model; you do not need any calculation.

By 1979, after two oil shocks and years of loose monetary policy, US inflation was above 10% and appeared to be heading higher. Paul Volcker became chair of the Federal Reserve and tightened monetary policy sharply. Over the next several years a deep recession followed, and inflation gradually came down. A student says: “I do not see how raising interest rates lowers inflation, and I do not see why a recession had to happen at all.”

Question [20 marks]. Using only the short-run model (the IS, MP and Phillips curves) and adaptive expectations, explain the chain by which Volcker’s tight monetary policy reduced inflation, why a recession was required, and how the episode ended. Answer in at most five sentences.