ECON 1550 — Problem Set 1

Spring 2026 — **Due:** February 4, 2026 at 11:59pm ET

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Submission: Canvas or Gradescope

Instructions

- When submitting to Gradescope, indicate the page where each question is answered to avoid a 5-point deduction.
- Full credit is given for correct answers. If multiple steps are needed, you must show them to get full credit.
- Points are shown for each part. Partial credit is given for partially correct answers; show your work to maximize it.
- Late submissions receive a score of zero.
- If you have technical problems submitting, email your work to the Head TA before the deadline.
- Collaboration with classmates is encouraged; use of generative AI is permitted but discouraged.
- You must write, understand, and submit your solutions individually. Copying other students' or AI-generated answers, even fragments, is not allowed.

1. **Multiple Choice (18 points)**

For each question, select the one correct answer.

(a) [2 points] In the IS-LM-PC model, when the money supply is exogenous and the nominal interest rate is endogenous, the LM curve is

- ◯ (A) flat
- ◯ (B) upward sloping
- ◯ (C) downward sloping
- ◯ (D) vertical

(b) [2 points] In the IS-LM-PC model, when the money supply is endogenous and the nominal interest rate is exogenous, the LM curve is

- ◯ (A) flat
- ◯ (B) upward sloping
- ◯ (C) downward sloping

◯ (D) vertical

(c) [2 points] Assume the nominal interest rate is exogenous. An increase in this exogenous nominal interest rate

◯ (A) keeps the IS curve unchanged

◯ (B) shifts the IS curve to the right

◯ (C) shifts the IS curve to the left

◯ (D) cannot be determined without more information

(d) [2 points] When inflation expectations are unanchored, if output exceeds potential output, the inflation rate over time

◯ (A) remains stable

◯ (B) spirals downward

◯ (C) increases

◯ (D) decreases

(e) [2 points] In the IS-LM-PC model with anchored inflation expectations, starting from a medium-run equilibrium, the government increases taxes. After the increase in taxes, the resulting medium-run equilibrium has

◯ (A) higher output than in the original medium-run equilibrium

◯ (B) a higher real interest rate than in the original medium-run equilibrium

◯ (C) an IS curve that is to the left of the IS curve of the original medium-run equilibrium

◯ (D) the answer depends on whether the LM curve is flat or upward sloping

(f) [2 points] In the Phillips curve, which of the following changes is associated with an increase in the current inflation rate (keeping everything else fixed)?

◯ (A) a decrease in the expected inflation rate

◯ (B) an increase in the unemployment rate

◯ (C) a lower natural rate of unemployment

◯ (D) an increase in the markup

(g) [2 points] Assume that the Phillips curve is given by

$$\pi_t = \pi_t^e + m + z - \alpha u_t.$$

Which of the following causes a reduction in the natural rate of unemployment?

◯ (A) an increase in m

◯ (B) an increase in z

◯ (C) an increase in α

◯ (D) an increase in π_t^e

(h) [2 points] The price setting equation is $P = (1 + m)W$. When there is perfect competition, we know that

◯ (A) $m > 0$

◯ (B) $m = 0$

◯ (C) $m < 0$

◯ (D) the price setting equation does not hold

(i) [2 points] The natural rate of unemployment is the rate of unemployment that occurs when

◯ (A) the money market is in equilibrium

◯ (B) the markup is zero

◯ (C) the economy is in a medium-run equilibrium

◯ (D) none of the above

2. **True, False, or Uncertain (12 points)**

For each statement below, answer true, false, or uncertain. Explain your answer. Use graphs or equations if useful.

(a) [3 points] In the accounting identity $Y = C + I + G$, a simultaneous 1% increase in all three variables Y, C, and I can occur while $G > 0$ remains unchanged.

(b) [3 points] In U.S. postwar data, real investment is substantially more volatile than real consumption and real government purchases.

Hint: Consult your intermediate macro textbook or plot the data using FRED.

(c) [3 points] In the IS-LM model, an increase in government spending raises output in the short run.

(d) [3 points] Assume that investment is a function of output and the real interest rate. In the IS-LM model with an exogenous money supply, a decrease in government spending lowers investment.

3. **A War Scare in the Short-Run IS-LM (32 points)**

Consider the following closed-economy IS-LM model. The goods market equilibrium condition is

$$Y = C + I + \bar{G},$$

where Y is output, C is consumption, I is investment, and $\bar{G}$ is government spending. The behavioral equations for consumption and investment are

$$C = c_0 + c_1(Y - \bar{T}), \qquad I = b_0 - b_1 i,$$

where $\bar{T}$ denotes taxes, i is the nominal interest rate, and $c_0 > 0$, $0 < c_1 < 1$, $b_0 > 0$, and $b_1 > 0$ are parameters. Assume expected inflation is constant (so changes in the nominal interest rate i correspond one-for-one to changes in the real interest rate). The money market equilibrium condition is

$$\bar{M}^s = m_0 + m_1 Y - m_2 i,$$

where $\bar{M}^s$ is real money supply (we normalize the price level $P = 1$ so $\bar{M}^s/P = \bar{M}^s$), and $m_0 > 0$, $m_1 > 0$, and $m_2 > 0$ are parameters. The exogenous variables are $\bar{G}$, $\bar{T}$, $\bar{M}^s$, and the model parameters. The endogenous variables are Y, C, I, and i.

(a) [4 points] Derive the IS curve and its slope.

(b) [4 points] Derive the LM curve and its slope.

(c) [4 points] Solve for equilibrium output Y^* and the equilibrium interest rate i^*.

(d) [4 points] Consider an increase in the money supply $\bar{M}^s$. What happens to Y^* and i^*? Explain using the IS-LM diagram.

(e) [4 points] Suppose a "war scare" raises precautionary demand for money, increasing m_0 to $m_0 + \Delta m_0$, where $\Delta m_0 > 0$. Find the new equilibrium level of output Y^{W}.

(f) [4 points] Under the war scare described in (e), how do the IS and LM curves shift? Explain the resulting movement in equilibrium Y and i.

(g) [4 points] Now suppose fiscal policy follows the rule

$$G = \bar{G} + g_1(Y - Y^*),$$

where Y^* is the original equilibrium output from (c). How does this rule affect the IS curve relative to the constant-$\bar{G}$ case?

(h) [4 points] Using an IS-LM diagram, assess whether the fiscal policy rule in (g) stabilizes the economy after the war scare.

4. **An Endogenous Initial Price Level (38 points)**

Consider a closed economy described by the following equations. The goods market is in equilibrium when

$$Y_t = C(Y_t - \bar{T}) + I(R_t) + \bar{G},$$

where Y_t is output, $C(\cdot)$ is the consumption function, $\bar{T}$ denotes taxes, $I(\cdot)$ is the investment function, R_t is the real interest rate, and $\bar{G}$ denotes government spending. Note that investment depends only on the interest rate R_t and does not depend on output Y_t. The money market is in equilibrium when

$$\frac{\bar{M}^s}{P_t} = \mathcal{L}(i_t, Y_t),$$

where $\bar{M}^s$ is the nominal money supply, P_t is the price level, $\mathcal{L}(\cdot,\cdot)$ is the real money demand function, and i_t is the nominal interest rate. The Fisher equation is

$$R_t = i_t - \pi^e,$$

where π^e is expected inflation. The labor market implies an aggregate supply relation of the form

$$P_t = (1+m)P_t^e F\left(1 - \frac{Y_t}{L}, z\right),$$

where m is the markup, P_t^e is the expected price level, L is the labor force, $u_t = 1 - \frac{Y_t}{L}$ is the unemployment rate, z is a catch-all variable for factors affecting the nominal wage other than P_t^e and u_t, and $F(\cdot,\cdot)$ is a function decreasing in its first argument and increasing in its second one. Assume the functional forms

$$C(Y - \bar{T}) = 1 + \frac{1}{2}(Y - \bar{T}),$$

$$I(R) = 2 - R,$$

$$\mathcal{L}(i, Y) = 2 + Y - 0.2i,$$

$$F(u, z) = 1 - \alpha u + z,$$

where $\alpha > 0$ is a parameter.

(a) [3 points] Is the consumption function $C(\cdot)$ increasing or decreasing in its argu-

ment? Provide economic intuition.

(b) [3 points] Is the investment function $I(\cdot)$ increasing or decreasing in its argument? Provide economic intuition.

(c) [3 points] Is the money demand function $\mathcal{L}(\cdot,\cdot)$ increasing or decreasing in each of its arguments? Provide economic intuition.

(d) [3 points] Derive the IS curve (when plotted with the nominal interest rate i_t on the vertical axis and output Y_t on the horizontal axis).

(e) [3 points] Derive the LM curve (when plotted with the nominal interest rate i_t on the vertical axis and output Y_t on the horizontal axis).

(f) [3 points] Combine the IS and LM relations to eliminate i_t and obtain an aggregate demand relation of the form

$$Y_t = AD\left(\frac{\bar{M}^s}{P_t}, \bar{T}, \bar{G}, \pi^e\right),$$

where AD is a function increasing in $\bar{M}^s/P_t$, $\bar{G}$, and π^e, and decreasing in $\bar{T}$.

Hint: Your final expression should be linear in $\bar{M}^s/P_t$, $\bar{T}$, $\bar{G}$, and π^e, i.e., AD is a linear function.

(g) [4 points] Find potential output, denoted Y^n, as a function of m, z, α, and L.

(h) [4 points] Explain briefly why, in this model, potential output Y^n does not depend on monetary and fiscal policy variables such as $\bar{M}^s$, $\bar{T}$, and $\bar{G}$.

(i) [4 points] Assume the economy is in a medium-run equilibrium at $t = 0$, so $Y_0 = Y^n$ and $P_0^e = P_0$. Use the aggregate demand relation from (f) and the condition $Y_0 = Y^n$ to solve for the initial price level P_0 as a function of $\bar{M}^s$, $\bar{T}$, $\bar{G}$, π^e and the parameters m, z, α, and L.

(j) [4 points] At time $t = 1$ the government announces an unexpected increase in taxes from $\bar{T}$ to $\bar{T} + \Delta T$, where $\Delta T > 0$. Assume that, in the short run, the price level is fixed at $P_1 = P_0$. Compute the short run equilibrium values of output Y_1 and the interest rate i_1. Express your answers in terms of $\bar{M}^s$, P_0, $\bar{T}$, $\bar{G}$, π^e, and ΔT.

(k) [4 points] Assume the tax increase is permanent. Assume the economy eventually returns to a medium-run equilibrium with $Y = Y^n$ and $P^e = P$. Compute the new medium-run price level P_{MR} and compare it to P_0.