ECON 1550 — Problem Set 8

Spring 2026

Due: April 8, 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. Chapter 6: Output and the Exchange Rate in the Long Run (48 points)

Question 1 from Chapter 4 of the textbook is:

> "Suppose there is a reduction in aggregate real money demand, that is, a negative shift in the aggregate real money demand function. Trace the short- and long-run effects on the exchange rate, interest rate, and price level."

In Problem Set 4, question 1, part (a), you were asked to answer that question, but only for the short run, and treating the expected exchange rate and the price level as exogenous.

Since you were asked to only focus on the short run and to treat the expected exchange rate as exogenous, knowing whether the shift in aggregate real money demand was temporary or permanent was irrelevant (the answer is the same in either case).

Now that we have developed the AA-DD model, we are better equipped to tackle the long-run effects part of the question and understand the difference between temporary and permanent changes in exogenous variables.

Answer the questions below using the AA-DD model given by the following equations:

$$\text{DD Schedule:} \quad Y = \underset{(+)}{\text{C}}(Y - T) + I + G + \underset{(+)}{\text{CA}}(EP^*/P, \underset{(-)}{Y - T}, \underset{(+)}{Y^*})$$

$$\text{AA Schedule:} \quad \frac{M^s}{P} = \underset{(-)}{\text{L}}(R^* + E^e/E - 1, \underset{(+)}{Y})$$

where the exogenous variables are in Table 1 and the endogenous variables are in Table 1.

AA-DD model: exogenous variables

Variable	Description
T	taxes
I	investment
G	government spending
M^s	money supply
α	slope of the Phillips curve
Y^f	full-employment level of output
Y^*	foreign income
P^*	foreign price level
R^*	foreign nominal interest rate

AA-DD model: endogenous variables

Variable	Description
Y	income, production
C	consumption
CA	current account
E	nominal exchange rate
E^e	expected nominal exchange rate
P	domestic price level

As usual, we assume that:

- in the long run, $Y = Y^f$, $E = E^e$, and $P = P^e$;
- in the short run, P is fixed, and E^e is equal to the value of E in the final long-run equilibrium.

Starting from an initial long-run equilibrium, there is an unanticipated reduction in the real money demand function from $\text{L}(\cdot, \cdot)$ to $\text{L}(\cdot, \cdot) - 1$.

(a) [8 points] Assuming the change the money demand function is temporary, sketch in an AA-DD diagram the initial equilibrium, the short-run equilibrium, the long-run equilibrium, and the transition from the short run back to the long run. A

qualitatively correct sketch is enough. Explain in words how and why the curves shift, or do not shift, at each point in time.

(b) [8 points] Plot the time paths of E, Y, and CA for the temporary change the money demand function considered in (a). A qualitatively correct path is enough.

(c) [8 points] Answer the same question as in part (a), but assuming the change the money demand function is permanent.

(d) [8 points] Answer the same question as in part (b), but assuming the change the money demand function is permanent.

(e) [8 points] Consider the same permanent reduction in real money demand as in parts (c) and (d), but now impose the Problem Set 4 assumption that both the expected exchange rate and the price level are exogenous. Explain what "goes wrong" under these assumptions.

Hint 1: We do not define what exactly we mean by "goes wrong" intentionally, as there are many ways in which this exercise is problematic. As you work through this question, you should run into trouble in some way. For example, you may find the model contradicts itself, the outcome is non-sensical, the intuition of behavioral equations is not respected.

Hint 2: This question is intended to make you think about why it was not a good idea to tackle the long run in Problem Set 4.

(f) [8 points] In the scenario from part (e), keep the expected exchange rate exogenous, but allow the price level to be endogenous. Does this fix the problem? Explain.

2. **Fixing the Real Exchange Rate (52 points)**

Problem Set 7, question 1, part (a), gives you a preview of how governments can keep the nominal exchange rate fixed at a desired level. Rather than increasing the money supply to fully finance a budget deficit, the central bank can decide to pick the size of the response of the money supply so that the nominal exchange rate remains unchanged. More generally, when the DD curve shifts, the central bank can use monetary policy to shift the AA just the right amount so that the shifted AA and DD intersect at a point that has the same nominal exchange rate as the original AA and DD before either of them shifts.

In this problem, we explore why, unlike the nominal exchange rate, the government can't keep the real exchange rate q fixed at a desired level.

The money market and foreign exchange market equilibrium conditions are

$$\frac{M^s}{P} = L(R, Y) = -5R + 0.8Y, \tag{1}$$

$$R = R^* + \frac{E^e}{E} - 1, \tag{2}$$

where M^s is the exogenous money supply, P is the endogenous domestic price level. Y is exogenous real income, R is the endogenous domestic interest rate, R^* is the exogenous foreign interest rate, E^e is the endogneous expected nominal exchange rate, and E is the endogenous nominal exchange rate.

The DD curve is given by:

$$Y = 0.5(EP^*/P) + 0.75Y. \tag{3}$$

The economy is initially at its long-run equilibrium with output equal to the exogenously given full-employment level of output $Y^f = 4$, and money supply $M_0^s = 2.6$ Assume $P^* = 1$ and $R^* = 0.12 = 12\%$ at all times.

(a) [8 points] Find the domestic interest rate R_0 in the initial long-run equilibrium.

(b) [8 points] Find the domestic price level P_0 in the initial long-run equilibrium. In the money market equation, if the interest rate is, for example, 5%, use $R = 0.05$ and not 5.

(c) [9 points] Find the nominal exchange rate E_0 and the expected nominal exchange rate E_0^e, in the initial long-run equilibrium.

(d) [9 points] Show that the real exchange rate in the initial long-run equilibrium is $q_0 = 2$.

(e) [9 points] The central bank decides it wants to fix the real exchange rate at a value of $\bar{q} = 1$ forever. To do so, it changes the money supply unexpectedly from its current level of $M_0^s = 2.6$ to some value M_{SR}^s in the short run and some value M_{LR}^s in the long run. Show that there are no values for M_{SR}^s and M_{LR}^s that can implement equilibria with the fixed real interest rate $q = \bar{q} = 1$.

Hint: Focus on the goods market in the long run.

(f) [9 points] You are the finance secretary for a very stubborn president who believes that $q = 1$ can be sustained forever. "This is easy", the president says. "Just increase the money supply as soon as output starts to decline toward Y^f". Explain to the president why this is a really bad idea.