Instructions

1. This exam is take-home, open-book, and open-notes. You may use any class materials at your disposal in preparing your answers.

2. You may not communicate in any way with anyone other than the instructor about the exam or the questions. It is to be done strictly on an individual basis.

3. The exam is due at the beginning of class on Monday, April 26.

4. These problems do not require difficult or tricky algebra. The solutions are not long or messy. My solution to each problem is less than two pages, including all intermediate steps. You will probably be able to work out the basic solutions to each problem in an hour or less if you understand what you did on the homework projects. If you get stuck, come and talk to me; I may be able to nudge you in the right direction, though I will not be as helpful as on the homework.

5. You are responsible for making sure that you understand each question clearly. In case of any ambiguity, be sure to consult the instructor.

1. Generalization of shock persistence in predetermined-price model. Consider the predetermined-price model as described in Section 6.9 of Romer and as discussed in class. As before, log aggregate demand is the sum of two components: monetary policy and an AD variable \( v_t \),

\[
m_t = m_t^* + v_t.
\]

Now suppose that the aggregate demand variable evolves according to

\[
v_t = \rho v_{t-1} + \epsilon_t,
\]

with \( 0 \leq \rho \leq 1 \). The shock \( \epsilon_t \) is white noise: it has expected value of zero, constant variance, and is uncorrelated with its own past and future values. As when we discussed the model in class, the monetary-policy rule is \( m_t^* = \alpha \epsilon_{t-1} \), with \( \alpha \) a parameter to be determined.
a. Calculate the equilibrium value of $y_t$ as a function of the current and past shocks $\varepsilon_t$ and $\varepsilon_{t-1}$. This expression should involve the policy parameter $\alpha$ and the aggregate-demand persistence parameter $\rho$.

b. Find the optimal monetary-policy rule (optimal $\alpha$) to minimize variation in $y$ around its equilibrium value, given the value of $\rho$.

c. What happens if $\rho = 1$? What happens if $\rho = 0$? Explain the intuition of these results.

2. Short answer questions. Give a one-paragraph answer for each of the following questions. Include a graph or equations if they aid your explanation:

a. In the Mundell-Fleming model with perfect capital mobility and floating exchange rates, how will a more expansionary monetary policy affect the exchange rate?

b. Explain how the modern theory of the Phillips curve differs from the original Phillips curve. Why is the modern theory more consistent with rational microeconomic behavior?

c. Explain why the Taylor fixed-price model predicts that a reduction of aggregate-demand growth from 10% to zero would lead to an immediate cessation of inflation, and why the Mankiw-Reis model predicts inflation persistence. What does each model predict for the behavior of output in the short run and long run? Why? Which is more realistic?

d. Define real price rigidity. How can real rigidities affect the social welfare effects of menu costs?

3. Varying menu costs. Consider a variation on Romer’s Problem 6.7 in which there are two kinds of firms: a fraction $\beta$ with low menu costs of $Z_1$ and the remainder $(1 - \beta)$ with higher menu costs of $Z_2$. Low-cost and high-cost firms produce the same output, so the average log-price that is relevant for each kind of firm is $p$, the average across all firms. All other aspects of the firm and the economy are as in Problem 6.7. You may assume that $\phi < 1$.

a. For given $Z_1$, calculate the ranges of $|m|$ for which a low-menu-cost firm adjusts its price (i) if no other firms adjust their prices, (ii) if other low-cost firms adjust their prices but high-cost firms do not, and (iii) if both other low-cost firms and high-cost firms adjust prices.

b. For given $Z_2$, calculate the ranges of $|m|$ for which a high-menu-cost firm adjusts its price (i) if no other firms adjust their prices, (ii) if low-cost firms adjust their prices but other high-cost firms do not, and (iii) if both low-cost firms and other high-cost firms adjust prices.

c. Use the formulas you derived in parts a and b to calculate the threshold values for $|m|$ when $Z_1 = 0.01$, $Z_2 = 0.04$, $K = 1$, $\phi = 0.2$, and $\beta = 0.75$.

d. There are three possible “symmetric” equilibria in this model: (N) no one adjusts price, (P) low-cost firms adjust price but high-cost firms do not, (F) all firms adjust price. For each of the following values of $m$, use the results from part c to show which of the three equilibria could occur. Multiple equilibria may be possible for
some values of $m$. Explain the logic of each result in terms of the decisions made by low-cost and high-cost firms.

i. $m = 0.05$

ii. $m = 0.15$

iii. $m = 0.3$

iv. $m = 0.45$

v. $m = 0.6$

vi. $m = 1.5$