

Instructions

1. This part of the 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 Wednesday, April 22nd.
 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.
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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

$$v_t = \rho v_{t-1} + \varepsilon_t,$$

with $0 \leq \rho \leq 1$. The shock ε_t is white noise: it has expected value of zero, constant variance, and is uncorrelated with its own past and future values. As before, the monetary-policy rule is $m_t^* = \alpha \varepsilon_{t-1}$, with α a parameter to be determined.

- a. Find the optimal monetary-policy rule (optimal α) to minimize variation in y around its equilibrium value.
- b. What happens if $\rho = 1$? What happens if $\rho = 0$? Explain the intuition of these results.

2. Macroeconomics of tariff policy. Countries sometimes use tariffs to attempt to improve their trade balance (net exports) and stimulate aggregate demand. Suppose that desired domestic expenditures are given by

$$E = \alpha_0 + \alpha_Y Y - \alpha_r r.$$

Net exports are

$$NX = \beta_0 + \beta_\varepsilon \varepsilon + \beta_\tau \tau,$$

where τ is the rate of tariff imposed by the domestic country on imports. Net capital inflows are

$$CF = \lambda(r - r^*).$$

Domestic monetary policy is given by a real-interest-rate rule as

$$r = \mu_0 + \mu_Y Y + \mu_\pi \pi.$$

Equilibrium in the domestic economy requires that $Y = E + NX$. Equilibrium in international payments requires $NX + CF = 0$. We will consider τ and r^* to be exogenous; all other variables are endogenous. Consider a short-run situation in which $\pi = \bar{\pi}$.

- a. In equilibrium, what effect will an increase in the tariff rate have on domestic output, the real exchange rate, and net exports? (Be sure that you solve the model *completely* before taking the appropriate partial derivatives.)
- b. Will the tariff increase improve the trade balance? Will it stimulate domestic output? Explain the logical intuition of this result in detail.
- c. What value of λ would be associated with perfect capital mobility? Would this change the results of part (b)?
- d. How, if at all, would the results of part (b) be different in the long run when π is variable and $Y = \bar{Y}$?

3. Varying menu costs. Consider a variation on Romer's Problem 6.7 in which there are two kinds of firms: a fraction β 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. $m = 1.5$