

Exam of the course “Monetary Economics”

Two hours. Please answer in English. The grading scale, which may be modified, is indicated only for general-guidance purposes.

Course presentation slides allowed, in paper format, possibly with hand-written annotations (on the slides or on separate sheets). No other document allowed, nor any electronic device (calculator, mobile phone...).

Exercise 1 (6 points)

The goal of this exercise is to study some positive implications of “external consumption habits” in the basic New Keynesian model. To do so, we make the same assumptions as in the basic New Keynesian model with technology shocks and without cost-push shocks (studied in Chapter 1 of the course), except that the representative household’s instantaneous utility function is now

$$U(C_t, N_t) = \frac{(C_t - h\bar{C}_{t-1})^{1-\sigma} - 1}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi},$$

where $h \in [0, 1)$ and \bar{C}_{t-1} denotes average consumption across households at date $t-1$ (the other notations are the same as in the course). Thus, the instantaneous utility of an individual household depends on how his/her own consumption level at a given date compares with a fraction h of the average consumption level across households at the previous date. This specification is called “external consumption habits” or “catching up with the Joneses”.

Question 1 Briefly explain why the Euler equation is now

$$Q_t = \beta \mathbb{E}_t \left\{ \left(\frac{C_{t+1} - h\bar{C}_t}{C_t - h\bar{C}_{t-1}} \right)^{-\sigma} \frac{P_t}{P_{t+1}} \right\}.$$

Log-linearize this equation around the steady state and use the goods-market-clearing condition $c_t = y_t$, the equilibrium-symmetry property $c_t = \bar{c}_t$ and the definition $\tilde{y}_t \equiv y_t - y_t^n$ to get the IS equation

$$\tilde{y}_t = \left(\frac{1}{1+h} \right) \mathbb{E}_t \{ \tilde{y}_{t+1} \} + \left(\frac{h}{1+h} \right) \tilde{y}_{t-1} - \frac{1}{\sigma} \left(\frac{1-h}{1+h} \right) (i_t - \mathbb{E}_t \{ \pi_{t+1} \} - r_t^n),$$

where now

$$r_t^n \equiv r + \frac{\sigma}{1-h} [\mathbb{E}_t y_{t+1}^n - (1+h)y_t^n + h y_{t-1}^n].$$

Briefly interpret the difference between this IS equation and the one in the course.

Question 2 Rewrite the IS equation as

$$\tilde{y}_t - h\tilde{y}_{t-1} = \mathbb{E}_t \{ \tilde{y}_{t+1} - h\tilde{y}_t \} - \left(\frac{1-h}{\sigma} \right) \tilde{r}_t,$$

where $\tilde{r}_t \equiv i_t - \mathbb{E}_t \{ \pi_{t+1} \} - r_t^n$ is the real-rate gap, and iterate forward in time to get

$$\tilde{y}_t - h\tilde{y}_{t-1} = - \left(\frac{1-h}{\sigma} \right) \mathbb{E}_t \left\{ \sum_{k=0}^{+\infty} \tilde{r}_{t+k} \right\}.$$

Assume that the real-rate gap follows an AR(1) process : $\tilde{r}_t = \gamma\tilde{r}_{t-1} - \xi_t$, where $\gamma \in (0, 1)$ and ξ_t is i.i.d. In the data, a surprise cut in the real rate seems to generate a hump-shaped response of the output gap ; under what condition on h and γ do we get such a hump-shaped response here, i.e. do we get $\partial\tilde{y}_{t+1}/\partial\xi_t > \partial\tilde{y}_t/\partial\xi_t > 0$? Interpret.

Exercise 2 (6 points)

The goal of this exercise is to study optimal monetary policy and its implementation when transaction frictions are introduced into the basic New Keynesian model (without steady-state inefficiency and without cost-push shocks). We admit that the presence of such frictions does not affect the log-linearized IS equation and Phillips curve, which remain

$$\begin{aligned} \tilde{y}_t &= \mathbb{E}_t \{ \tilde{y}_{t+1} \} - \frac{1}{\sigma} (i_t - \mathbb{E}_t \{ \pi_{t+1} \} - r_t^n), \\ \pi_t &= \beta \mathbb{E}_t \{ \pi_{t+1} \} + \kappa \tilde{y}_t, \end{aligned}$$

but affects the welfare-loss function, which becomes

$$L_t = \mathbb{E}_t \left\{ \sum_{k=0}^{+\infty} (\pi_{t+k}^2 + \lambda_y \tilde{y}_{t+k}^2 + \lambda_i i_{t+k}^2) \right\},$$

where $\lambda_y > 0$ and $\lambda_i > 0$, and where all the other notations are the same as in the course.

Question 1 Show that the first-order condition for optimal discretionary monetary policy is

$$i_t = \frac{\kappa}{\sigma \lambda_i} \pi_t + \frac{\lambda_y}{\sigma \lambda_i} \tilde{y}_t. \quad (1)$$

Question 2 If the central bank adopts (1) as its interest-rate rule, what is the necessary and sufficient condition for local-equilibrium determinacy ? (Hardly any computation is needed to answer this question : one can use the results presented in the course, after noting that $\tilde{y}_t = x_t$ in the absence of cost-push shocks.)

Question 3 Does an increase in λ_y , everything else equal, make this condition more likely or less likely to be satisfied ? Same question with λ_i (instead of λ_y). Interpret your answers.

Commentary (8 points)

Comment, **in the light of the course**, upon the following excerpt from the speech made by Michelle W. Bowman (member of the Federal Reserve Board of Governors) on September 26th, 2025, entitled “Thoughts on Monetary Policy Decision-Making and Challenges Ahead”. In particular, while commenting on the first and third paragraphs of this excerpt, explain **in the context of the basic New Keynesian model** (i) the trade-off between output-gap stabilization and inflation stabilization, and (ii) the way in which monetary policy should ideally react to positive technology shocks.

“Recent data show a materially more fragile labor market along with inflation that, excluding tariffs, has continued to hover not far above our target. Given this shift in labor market conditions, at last week’s FOMC meeting I supported beginning the process of removing policy restraint and bringing the federal funds rate back to its neutral level. (...)

With tariff-related price increases likely being a one-time effect, my view is that inflation will return to 2 percent (...). Because changes in monetary policy take time to work their way through the economy, it is appropriate to look through temporarily elevated inflation readings and therefore remove some policy restraint to avoid weakening in the labor market, provided that long-run inflation expectations remain well anchored.

In addition, putting tariffs aside, the U.S. economy may also be experiencing an extended productivity surge, in large part because of recent technological advances. (...) These developments reinforce the case for removing policy restraint because monetary policy should accommodate productivity shocks that raise potential output.”