

Exam of the course “Monetary Economics”

Two hours. Course presentation slides allowed, in paper format, possibly with hand-written annotations. No other document allowed, nor any electronic device (calculator, mobile phone...).

1 Exercise (10 points)

The goal of this exercise is to study the positive and normative implications of subsidy and taste shocks in the basic New Keynesian model. To that aim, we remove technology and cost-push shocks from the model considered in Chapter 1 of the course (i.e. we set $A_t = 1$ and $\varepsilon_t = \varepsilon$); we replace the constant exogenous employment subsidy τ by a stochastic one, noted τ_t and referred to as a “subsidy shock”; and we assume that the period utility is now

$$U(C_t, N_t) = \frac{C_t^{1-\sigma} - 1}{1-\sigma} - \xi_t \frac{N_t^{1+\varphi}}{1+\varphi}$$

where $\xi_t > 0$ is an exogenous “taste shock”.

As a reminder, in the basic New Keynesian model without any shock, the following log-linearized equilibrium conditions hold, up to first order :

$$\begin{aligned} y_t &= (1-\alpha)n_t && \text{(aggregate production function),} \\ w_t - p_t &= \sigma c_t + \varphi n_t && \text{(labor-consumption trade-off condition),} \\ c_t &= \mathbb{E}_t \{c_{t+1}\} - \frac{1}{\sigma} (i_t - \mathbb{E}_t \{\pi_{t+1}\} - \bar{i}) && \text{(Euler equation),} \\ \pi_t &= \beta \mathbb{E}_t \{\pi_{t+1}\} + \kappa \tilde{y}_t && \text{(Phillips curve),} \\ y_t &= c_t && \text{(goods-market-clearing condition),} \end{aligned}$$

where the notations are the same as in the course (in particular, the output gap $\tilde{y}_t \equiv y_t - y_t^n$ is the difference between the equilibrium output level y_t and the natural level of output y_t^n , both expressed in log).

Question 1 Briefly explain why, among all the equilibrium conditions written above, only the labor-consumption trade-off condition is changed by the introduction of subsidy and taste shocks into the model, and determine how this condition is changed.

Question 2 Derive an expression for the (log) average real marginal cost mc_t as a function of y_t , τ_t , ξ_t , and the parameters α , σ , and φ .

Question 3 Briefly explain why, under flexible prices and at the first order, $mc_t = -\mu \equiv -\log\left(\frac{\varepsilon}{\varepsilon-1}\right)$. Deduce, from this last equation and the previous question, an expression for

the natural level of output y_t^n as a function of τ_t , ξ_t , and the parameters α , σ , φ , and μ . Do a positive subsidy shock (i.e. a rise in τ_t) and a positive taste shock (i.e. a rise in ξ_t) increase or decrease the natural level of output? Briefly explain the mechanism.

Question 4 Rewrite the Euler equation as

$$\tilde{y}_t = \mathbb{E}_t \{ \tilde{y}_{t+1} \} - \frac{1}{\sigma} (i_t - \mathbb{E}_t \{ \pi_{t+1} \} - r_t^n) \quad (\text{IS equation})$$

and derive an expression for the natural rate of interest r_t^n as a function of τ_t , τ_{t+1} , ξ_t , ξ_{t+1} , and the parameters α , σ , φ , and \bar{i} . Can monetary policy implement the natural allocation? Briefly interpret.

Question 5 Write down the social-planner optimization problem and solve it to get the social-planner output level as a function of ξ_t and the parameters α , σ , and φ . Under what condition do the social-planner output level and the natural level of output coincide with each other? Briefly interpret.

2 Commentary (10 points)

Comment briefly, in the light of the course, upon the following excerpt from the speech entitled “U.S. Economic Outlook and Monetary Policy” made by R.H. Clarida – vice-chairman of the Federal Open Market Committee (FOMC) of the Federal Reserve – on January 8, 2021, and, in so doing, explain in particular : (i) the mechanism(s) through which forward guidance can support the economy, depending on whether it is date-based or outcome-based forward guidance, and depending on whether it is forward guidance about the policy rate or the balance sheet; and (ii) the pros and cons of the Federal Reserve’s new objective of achieving inflation that averages 2 percent over time.

“At our most recent FOMC meetings, the Committee made important changes to our policy statement that upgraded our forward guidance about the future path of the federal funds rate and asset purchases, and that also provided unprecedented information about our policy reaction function. As announced in the September statement and reiterated in November and December, with inflation running persistently below 2 percent, our policy will aim to achieve inflation outcomes that keep inflation expectations well anchored at our 2 percent longer-run goal. We expect to maintain an accommodative stance of monetary policy until these outcomes – as well as our maximum-employment mandate – are achieved. We also expect it will be appropriate to maintain the current target range for the federal funds rate at 0 to 1/4 percent until labor market conditions have reached levels consistent with the Committee’s assessments of maximum employment, until inflation has risen to 2 percent, and until inflation is on track to moderately exceed 2 percent for some time.

In addition, in the December statement, we combined our forward guidance for the federal fund rate with enhanced, outcome-based guidance about our asset purchases. We indicated that we will continue to increase our holdings of Treasury securities by at least \$80 billion per month and our holdings of agency mortgage-backed securities by at least \$40 billion per month until substantial further progress has been made toward our maximum-employment and price-stability goals.

The changes to the policy statement that we made over the fall bring our policy guidance in line with the new framework outlined in the revised Statement on Longer-Run Goals and Monetary Policy Strategy that the Committee approved last August.”