Macroeconomics Field Exam
August 2022
Department of Economics
UC Berkeley

(3 hours)

Answer Both Parts

Part I (Yuriy Gorodnichenko): 90 points = 90 minutes

Short questions (True/False + a brief explanation; explanation determines the grade; 45 minutes=45 points):

1. The real business cycle model predicts that demand shocks can be a source of macroeconomic fluctuations.
2. Prices are flexible because firms have sticky information.
3. In the data, a fiscal consolidation increases output.
4. The bandpass filter has better properties than the Hodrick-Prescott filter.
5. In monetary economics, recursive ordering in VARs typically posits that monetary policy shocks can move asset prices but not inflation on impact.
6. The labor demand curve in the basic real business cycle model may be downward sloping if the economy has sunspot equilibria.
7. Inflation expectations in the New Keynesian Phillips curve capture past dynamics of marginal costs.
8. Relative to previous recessions, the COVID-19 recession was typical because consumption fell roughly as much as investment did.
9. Nominal rigidity is necessary for fiscal multipliers to be less than one.
10. Sharp identification of structural parameters is usual for DSGE models.
11. Price level targeting (PLT) is better than inflation targeting (IT) because PLT is a form of credible discretion and IT is a form of non-credible discretion.
12. Dynamic inconsistency in policy means that policy actions have to be supported by policy promises.
13. In the data, inflation reacts quickly ("jumps") to a monetary policy shock. In the basic New Keynesian model, inflation responds slowly to a monetary policy shock.
14. The Taylor principle ensures a unique rational expectations equilibrium in the basic New Keynesian model if steady-state inflation is positive.
15. Raising inflation target from 2% to 4% has no effect on welfare.

Long question. The cost channel of monetary policy. (45 minutes=45 points)

This problem will study the same sticky-price model as what we used in class with one important difference: we will assume that intermediate good firms must pay their workers before they receive payments from the sale of their products. As a result, firms have to borrow the wage payments at the beginning of the period from financial markets and repay it at the end of each period. The key modification that this introduces is that the marginal cost of labor now depends on the interest rate (the cost of borrowing).

To be able to pay workers before the firms receive payments from the sale of their final goods, firms must borrow at the start of each period the total amount they will pay their workers, then repay it back with interest at the end of the period. Thus, effective cost of a worker is no longer just the wage but is now the wage times the interest rate.

To nest our original model within this new framework, we will introduce a parameter δ which denotes the fraction of wage payments that actually have to be paid ahead of time. Thus, when $\delta = 0$, no wage payments must be made early and we will recover the model from class. When δ=1, then all wage payments will have to be made early. $0 < \delta < 1$ will incorporate cases where only a fraction of wage payments must be made at the start of the period.

The profit-maximization problem for a flexible-price firm is therefore:

$$\max P_t(i)Y_t(i) - R_t^{\delta} W_t N_t(i)$$

subject to

$$Y_t(i) = A_t N_t(i)$$
$$Y_t(i) = Y_t \left(\frac{P_t(i)}{P_t}\right)^{-\varepsilon}$$

a) Prove that the optimal price for a flexible-price firm is

$$P_t(i) = \left(\frac{\varepsilon}{\varepsilon - 1}\right) MC_t$$

where marginal costs are now defined as

$$MC_t = \frac{R_t^{\delta} W_t}{A_t}.$$

b) Assume that the consumer's problem is exactly like what we derived in class: the representative consumer's maximization problem is now given by

$$\max E_t \sum_{j=0}^{\infty} \beta^t \left[\frac{e^{g_t} C_{t+j}^{1-\sigma}}{1-\sigma} - \frac{\int_0^1 N_{t+j}^{1+\varphi}(i)di}{1+\varphi}\right]$$

Thus, the labor supply condition (intratemporal condition) is

$$\frac{W_t}{P_t} = e^{-g_t} N_t^{\varphi} C_t^{\sigma}$$

and the Euler intertemporal condition is

$$1 = \beta E_t \left[e^{g_{t+1} - g_t} \left(\frac{C_t}{C_{t+1}} \right)^{\sigma} R_t \Pi_{t+1}^{-1} \right].$$

Finally, assume $Y_t = C_t$.

Prove that the flexible-price level of GDP (Y^n) is

$$Y_t^n = \left[\left(\frac{\varepsilon - 1}{\varepsilon} \right) (R_t^n)^{-\delta} A_t^{1+\varphi} e^{g_t} \right]^{\frac{1}{\varphi + \sigma}}$$

where R^n is the interest rate that would occur if all firms had flexible prices.

What does this expression imply about monetary neutrality when all firms have flexible prices?

c) Determinacy with the cost channel. With some work, one can show that the model including the cost channel can be written as

$$x_t = E_t x_{t+1} - \left(\frac{1}{\sigma} \right) (r_t - E_t \pi_{t+1}) + exog$$

$$\pi_t = \beta E_t \pi_{t+1} + (\varphi + \sigma) \kappa x_t + \kappa \delta r_t + exog$$

where $\kappa = (1 - \theta)(1 - \beta\theta)/\theta$.

Assume a basic Taylor rule: $r_t = \varphi_\pi \pi_t$.

Prove that a unique rational expectations equilibrium exists if

$$1 < \varphi_\pi < \frac{1}{\delta} \left[1 + \frac{\varphi}{\sigma} + \frac{1 - \beta}{\kappa} \right].$$

Explain intuitively.

Note that this condition is sufficient but not necessary for a unique rational expectations equilibrium (REE), i.e., there are values of φ_π outside this range such that a unique REE exists.

d) Fully characterize the conditions such that a unique REE exists.

Part II (Emi Nakamura): 90 points = 90 minutes

1. (A) **10 points** Write down the New Keynesian Phillips Curve. What is the motivation of Gali and Gertler (1999) to use an instrumental variables approach in estimating this equation in the context of *their* structural model (here, assume that all of their identifying assumptions hold).
   (B) **10 points** What violations of Gali and Gertler's assumptions might you be most concerned about in the estimation of the Phillips curve? How would these bias the results?
   (C) **10 points** Mavroeidis et al. raise concerns about specification and sampling uncertainty in relation to the types of methods Gali and Gertler use. Briefly summarize these concerns.

2. **10 points** A recent literature has estimated Phillips curves using regional data. Suppose you find that the slope of the regional Phillips curve for gasoline is flat. What can you conclude about the aggregate Phillips curve for gasoline?

3. **10 points** Gourinchas and Parker (2002) find a hump in the lifecycle profile of consumption, and use this to inform their theoretical analysis. What explains the hump in their model (be sure to explain both the "up" and the "down" in the hump)? How do Gourinchas and Parker account for changes in peoples' desired consumption over time (e.g., due to having children)?

4. (A) **10 points** Kaplan and Violante (2014) develop a model in which the "Wealthy Hand-to-Mouth" play an important role. Why does this model yield a higher marginal propensity to consume than its counterpart with only "one asset", when calibrated to match the empirical facts on household balance sheets for the US data?
   (B) **10 points** In Kaplan and Violante's model illiquid assets must have high returns relative to liquid assets to generate high MPCs. How does this argument differ in the hyperbolic discounting model of Angeletos, Laibson, Repetto, Tobacman and Weinberg? Does the return differential between illiquid and liquid assets need to be equally large in the hyperbolic discounting model?

5. **10 points** Suppose the Fed wishes to stimulate the economy to respond to a large recession. In the 3 equation New Keynesian model, would it be more effective to lower the real interest rate by 25 basis points this year (for one year), or to promise to lower the real interest rate by 25 basis points next year (for one year)? Assume the promise is fully credible and that the path of the real interest rate is left unchanged other than the shock. Explain, with reference to the equations of the model.

6. **10 points** Some empirical evidence suggests that surprise monetary contractions cause professional forecasters to increase expectations of future growth. Suppose this evidence is true. Now suppose that the Federal Reserve commits to a monetary policy rule whereby interest rates are mechanically related to inflation and unemployment (e.g., a Taylor rule). In this model, there are no monetary surprises since interest rates are perfectly predictable by the rule. Would you expect predictable interest rate increases to have the same effects on growth expectations as unpredictable ones? Why or why not?