Macroeconomics Field Exam
August 2018
Department of Economics
UC Berkeley

(3 hours)

Part I.

Field exam questions for the macro field. (about 45'each)

Question 1

Present and discuss at least two specific models that can account for the following empirical facts:

a) The marginal product of capital is largely equalized across countries;

b) Over the last twenty years, capital has been flowing (on net) from rapidly growing developing and emerging countries towards more mature economies

c) Over the last twenty years, world real interest rates have declined;

You will discuss in detail the mechanisms in each model that generates the empirical facts (a)-(c).

Question 2

Consider a small economy that lasts two periods, labelled 1 and 2. The country begins the first period without foreign assets or debt and receives an endowment $\bar{Y}$. In the second period, it receives a stochastic endowment $Y_2 = \bar{Y} + \epsilon$ where ϵ is distributed on the interval $[\underline{\epsilon}, \bar{\epsilon}]$ with distribution $\pi(\epsilon)$, such that $E[\epsilon] = 0$ (you may assume that $\bar{Y} + \underline{\epsilon} > 0$). Utility is defined as: $u(C_1) + \beta E[u(C_2)]$ where $\beta < 1$ is the discount factor and the period utility u satisfies $u'(C) > 0$, $u''(C) < 0$ and the usual Inada conditions.

1. The small country can purchase insurance from risk neutral insurers who compete on date 1 to offer zero-expected-profits contracts for date 2. Denote $P(\epsilon)$ the payment that the country makes to the insurers in state ϵ. Assume also that the country can borrow and lend at a given world real interest rate r. Denote B_2 the amount of foreign assets accumulated at the end of period 1.

   (a) Suppose first that we have full insurance, i.e. that the country can commit to any repayment schedule $P(\epsilon)$ as long as $P(\epsilon) \leq Y_2 + (1 + r) B_2$. Characterize the full insurance allocation.

   (b) Assume now that the country cannot promise to honor its insurance payments. Due to enforcement limitations, the total amount of foreign liabilities (both from the insurance schedule and foreign debt repayment) cannot exceed a fraction η of the country's second period output $\bar{Y} + \epsilon$. Conversely, insurers can compensate themselves by seizing any foreign asset owned by the country.

i. Write down the Incentive Compatibility condition that the insurance contract must satisfy.

ii. Write down the problem for the optimal incentive compatible contract with the associated constraints.

iii. Write down the first-order necessary conditions for this problem as well as the complementary slackness condition.

iv. Show that for all ϵ such that the incentive compatibility constraint does NOT bind, the following holds:

$$u'(C_1) = \beta(1 + r)\, u'(C_2(\epsilon))$$

where $C_2(\epsilon)$ denotes consumption in period 2, state ϵ. Interpret.

v. Assume for the rest of part (b) that preferences are logarithmic. Find the largest $\bar{\epsilon}$, called $\bar{\epsilon}_m$, such that full insurance can be achieved. How does $\bar{\epsilon}_m$ vary with the discount factor?

vi. Assume that $\bar{\epsilon}_m < \bar{\epsilon}$. Does the country borrow or lend when $\beta(1 + r) = 1$ and $\eta = 0$? Why?

(c) Assume now that insurers cannot seize the foreign assets of the country and the maximum repayment cannot exceed $\eta\left(\bar{Y} + \epsilon\right)$. The country can still borrow and lend at the world real interest rate r. How does the availability of borrowing/savings affect the optimal insurance contract? Why?

(d) Discuss how your answer to part (c) would differ if insurers could not inflict direct punishments but had to rely instead on reputational mechanism. In particular, explain whether insurance can be sustained in equilibrium when insurers cannot seize savings.

Part II.

Short questions.

Please provide brief explanations to the statements provided below. Explanation determines the grade (45 minutes):

1. A key determinant of inflation in estimated DSGE models is the price markup shock which is consistent with a steep Phillips curve. (3 minutes)

2. The Kalman filter offers a natural framework to estimate DSGE models. (3 minutes)

3. The Hodrick-Prescott and similar filters preserve the correlation structure of the "raw" data. (3 minutes)

4. Valerie Ramey reports that macroeconomists know little about the effects of monetary policy on the economy. (3 minutes)

5. Real rigidity is a necessary element in real business cycle models to generate long-lasting responses to productivity shocks. (3 minutes)

6. Consumption Granger causes income which means we should order consumption before income in VARs. (3 minutes)

7. Ben Bernanke claims that the Phillips curve is flat because the central bank effectively fixes ("anchors") inflation expectations. (3 minutes)

8. Conditional convergence of incomes means that the U.S. and Canada should eventually have the same levels of income. (3 minutes)

9. Full-information rational expectations (FIRE) models typically provide more persistence of macroeconomic variables than models with information frictions. (3 minutes)

10. High-frequency identification of monetary policy shocks is better than recursive identification of these shocks in VARs. (3 minutes)

11. Unemployment rate is a coincident business cycle indicator. (3 minutes)

12. Flat labor demand and flat labor supply curves are sufficient to generate large fluctuations of wages in real business cycle models. (3 minutes)

13. Menu cost models with multi-product firms predict that price changes should behave as if they are time-dependent. (3 minutes)

14. The Calvo model of sticky prices implies that the probability of price adjustment increases in time since the last price change. (3 minutes)

15. Introducing zero-lower bound on nominal interest rates into New Keynesian models makes determinacy of these models more likely. (3 minutes)

Longer question (45 minutes)

An economy has the following equations:

$$\log(p_t) + \log(y_t) = \log(M_t)$$

$$\log(y_t) = \alpha \times \log(n_t)$$

$$\log(W_t) = \log(p_t) + \log \alpha + (\alpha - 1)\log(n_t)$$

$$\log(W_t) = x_{t-1}$$

where p_t is the price level, y_t is real output, n_t is employment, $\alpha \in (0,1)$ is a constant, M_t is the nominal money supply, and W_t is the nominal wage. Treat M_t as exogenous. Treat $p_t, y_t, n_t W_t, x_t$ as endogenous.

The nominal wage in effect at time t was set by contract in period $t-1$. That is the meaning of the last equation: x_{t-1} is the log of wage for time t set at time $t-1$.

In each period, employment is determined by the labor demand curve and the contract wage. The contract wage for the next period is then determined as follows. Workers would like to supply $\bar{n}$ units of labor (i.e., $\bar{n}$ is a given constant). They find the intersection of the current labor demand curve and a perfectly inelastic labor supply curve at $n = \bar{n}$, and they set the current x and the log of nominal wage at that intersection. In other words, we have an additional equation:

$$x_t = \log(p_t) + \log(\alpha) + (\alpha - 1)\log(\bar{n}).$$

a. Give a brief description of where the first three equations could have come from.

b. Show how the first four equations could be given a graphical representation as a short-run AS-AD model (including such a graph in your answer).

c. Solve down to a single difference equation for x. What is the eigenvalue for the homogenous part of this equation? What type of variable is x? Is the model "determinate" and "stable"? Give a brief explanation for your answer.

d. Suppose at time $t = 0$, the Federal Reserve raises the nominal money supply for a single period above what it would otherwise have been. What, if anything, is the effect on n_0, p_0 and n_1? Show your steps. What, if anything, happens to the real wage at time $t = 0$ and at time $t = 1$ with the Federal Reserve action? How does this relate to what happens to employment?

e. Suppose M is constant for all time. Is there a stationary state level of employment, say, n^*? If so, how does n^* depend on the level of M? Show your work.

f. Discuss briefly changes which you might make, keeping the contracting story here, but making the model more consistent with the spirit of rational expectation's literature.