Written Exam at the Department of Economics summer 2018

Macroeconomics III
Final Exam

June 5, 2018

(3-hour closed book exam)

Please note that the language for this exam is English.

This exam question consists of 3 pages in total

NB: If you fall ill during the actual examination at Peter Bangsvej, you must contact an invigilator in order to be registered as having fallen ill. Then submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.

1 (20 points) Answer true, false, or uncertain. Justify your answer.

According to the basic real business cycle model, the observed fluctuations of consumption and investment are the optimal responses to exogenous supply shocks. Thus, government intervention to smooth consumption volatility is not desired.

2 (20 points) Answer true, false, or uncertain. Justify your answer.

In an open economy, a reduction in labor taxes financed with debt will have no effect on the current account. This is an example of Ricardian equivalence.

3 (20 points) Answer true, false, or uncertain. Justify your answer.

According to the Meltzer and Richard (1981) model all increases in inequality, as measured by the Gini coefficient, lead to an increase in redistribution.

4 (60 points) Consider a Ramsey economy with a continuum of households and firms operating under perfect competition. There is no population growth, and the representative household is infinitely lived, has a unitary endowment of time each period, and maximizes the following objective function under perfect foresight:

$$\max_{c_t, x_t, k_{t+1}} \sum_{t=0}^{\infty} \beta^t \left[\log c_t + \frac{x_t^{1-\epsilon}}{1-\epsilon} \right]$$

subject to the budget constraint:

$$c_t + R_t k_t = w_t(1 - x_t) + k_{t+1}$$

where c_t is household consumption, x_t is the amount of leisure consumed (such that $1 - x_t$ is labor supply), w_t is the wage rate, k_{t+1} is saving assumed to be in capital, and $R_{t+1} = 1 + r_{t+1}$ is the gross return on that saving (we assume no depreciation of capital). $0 < \beta < 1$ is the time discount factor, and $0 < \epsilon < 1$ measures the concavity of leisure in preferences, and is thus related to the elasticity of labor supply.

Production technology is Cobb-Douglas such that the representative firm i takes factor prices as given and maximizes

$$\Pi_t^i = {K_t^i}^{\alpha} {L_t^i}^{1-\alpha} - r_t K_t^i - w_t L_t^i$$

where K_t^i is the demand for capital and L_t^i the demand for labor, and $0 < \alpha < 1$.

a) Write the Lagrangian for households' problem and derive its first order conditions with respect to c_t, x_t, and k_{t+1}. Derive the Euler equation and interpret it.

b) Characterize the steady state for this economy. How are initial consumption and leisure determined for each possible level of k_0? Explain.

c) Assume that the economy is in a steady state and there is an unexpected permanent increase in parameter ϵ. Explain how this affects the steady state levels of capital, consumption and leisure.

5 (60 points) Consider an economy where aggregate demand satisfies

$$y_t = m_t - p_t$$

where y_t is output, m_t is nominal aggregate demand, and p_t is the price level (all lower case variables are in logs). It is assumed that there are shocks to nominal aggregate demand. This is modelled by having m_t stochastic.

In this economy there is price setting under imperfect competition. Firms predetermine prices for two periods as a function of demand and prices (fixed or expected) of competitors. Assume symmetry such that half the firms make decisions on odd periods and the other half on even periods, such that:

$$p_t = \frac{1}{2}(p_t^1 + p_t^2)$$

where p_t^1 is the price set at time t for period t (with information known at time $t-1$) and p_t^2 is the price set at time $t-1$ for period t (with only information know at time $t-2$). Firms respond to an increase in aggregate demand by producing more, and in that case would have to pay higher wages to induce workers to work more. Since firms have some monopoly power in setting prices, they pass the increase in costs (the higher wages) into prices. Thus the relative price, $p_t^i - p_t$, set by a producer is given by:

$$p_t^i - p_t = \phi[E[m_t|I_{t-i}] - E[p_t|I_{t-i}]]$$

where ϕ measures the degree of real rigidity. Information known at time $t-i$ includes all past values of m but not m_{t-i+1}.

a) Find $E[p_t^1|t-2]$ as a function of m_t and expectations on m_t. Similarly find p_t^1 and p_t^2.

b) Find equilibrium p_t and y_t as functions of m_t and expectations on m_t.

c) Do monetary shocks have persistence on output? Interpret.