Economics 205B, Winter 2006
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Midterm: Answer two (2) questions

1. Suppose the central bank dislikes inflation variability around a target level π^*. It also prefers lower unemployment. Its objective is to minimize

$$V = \lambda u + \frac{1}{2}\pi^2,$$

where u is the unemployment rate. The economy is described by

$$u = u_n - a\left(\pi - \pi^e\right) + v,$$

where u_n is the natural rate of unemployment and π^e is expected inflation. Expectations are formed by the public before observing the disturbance v. The central bank can set inflation after observing v.

   (a) What is the equilibrium rate of inflation under discretion? What is the equilibrium unemployment rate?

   (b) How is equilibrium inflation affected by v? Explain.

   (c) What is the equilibrium rate of inflation under commitment? What is the equilibrium unemployment rate?

   (d) How does inflation differ under discretion and under commitment? Explain how the inflation bias is affected by λ and by a.

2. Consider a basic real business cycle model. Suppose the representative agent maximizes the expected discounted value of utility from $t = 0$ to $t = \infty$, where each period, utility is given by

$$\frac{C_t^{1-\sigma}}{1-\sigma} - \Omega\frac{\left(\gamma_t N_t\right)^{1+\eta}}{1+\eta}.$$

σ, η, and Ω are constants, cC_t is consumption in period t, N_t is the fraction of time spent working in period t, and $\gamma_t = (1 + \hat{\gamma}_t)$ is a stochastic shock to the disutility of working. Assume γ_t has a mean of 1 and is serially uncorrelated. (Note that $\hat{\gamma}_t$ is the percent deviation of γ_t from its steady-state value, $\hat{\gamma}_t$ has mean zero.)

   (a) Derive the linearized Euler condition from the representative agent's decision problem. Does it depend on $\hat{\gamma}_t$?

   (b) Derive the linearized labor supply equation for this model. (Assume the representative agent sells labor services at a real wage w_t in a perfectly competitive labor market.) Does it depend on $\hat{\gamma}_t$?

(c) Explain intuitively the effect $\hat{\gamma}$ has on the correlation between output and consumption, between consumption and employment, between employment and real wages. (That is, does a positive realization of $\hat{\gamma}$ cause output and consumption to move together or in different directions, etc.)

(d) Does $\hat{\gamma}$ have the same effects on the correlations you discussed in part (c) as the fiscal shocks we discussed in class? If not, how do they differ?

3. Consider a basic real business cycle model in which the preferences of the representative household are given by

$$U_t(j) = \frac{[C_t(j) - bC_{t-1}]^{1-\sigma}}{1-\sigma} - \Psi \frac{N_t(j)^{1+\eta}}{1+\eta}, \; \sigma, \eta > 0$$

where $C_t(j)$ is consumption of household j at time t and C_t is aggregate consumption at time t. $N_t(j)$ is the fraction of time household j spends in market work activities. Notice that the utility household j receives from consuming $C_t(j)$ depends on *aggregate* consumption C_{t-1} in the previous period (this is called external habit persistence; in problem set 3 you dealt with internal habit persistence in which utility depends on the household's own level of past consumption $C_{t-1}(j)$). Household j takes aggregate consumption C_{t-1} and C_t as given in choosing $C_t(j)$. However, in equilibrium $C_t(j) = C_t$ since all households are identical.

(a) Set up the individual household's optimization problem. What is the first order condition for the optimal choice of $C_t(j)$? What is the Euler condition for household j?

(b) What is the Euler condition in equilibrium (i.e., when $C_t(j) = C_t$)?

(c) Set up the social planner's problem for picking optimal consumption. The social planner recognizes that $C_t(j) = C_t$. Derive the Euler condition from the social planners problem?

(d) Did you get the same result in (b) and (c)? If not, explain.