

UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Postponed exam: **ECON4310 – Macroeconomic Theory**

Date of exam: Monday, December 20, 2010

Time for exam: 09:00 a.m. – 12:00 noon

The problem set covers 3 pages (incl. cover sheet)

Resources allowed:

- No resources allowed

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

Labor supply, productivity and business cycles

Suppose the utility function of a consumer is

$$V_0 = \sum_{t=0}^{\infty} \beta^t [u(c_t) + v(\ell_t)] \quad (1)$$

where $0 < \beta < 1$ is a subjective discount factor, c_t is consumption in period t and ℓ_t is leisure time. Hours worked are $h_t = 1 - \ell_t$. The functions u and v are increasing and concave. The consumer maximizes utility for given sequences of wages, W_t ($t = 0, 1, 2, \dots$) and interest rates, r_t ($t = 0, 1, 2, \dots$) and a given initial stock of assets.

1. Write down the budget constraint for the consumer. Explain briefly what is meant by a no-Ponzi-game condition and what role it plays.
2. Derive the first-order conditions for maximum utility.
3. Assume from now on that the utility functions have the particular form

$$u(c) = \frac{c^{1-\theta}}{1-\theta}, \quad v(\ell) = \mu \frac{\ell^{1-\gamma}}{1-\gamma} \quad (2)$$

Find the first-order conditions for this case and interpret them.

4. Suppose that both the interest rate and the wage rate are constant over time, $r_t = r$ and $W_t = Aw$ where A is a constant productivity factor. Discuss how the growth rates of consumption and leisure are determined in this case. Emphasize the role of the parameters θ and γ . When are the two growth rates equal? What are the implications for the evolution of working time? Explain how you can determine the absolute levels of consumption and leisure. (If you are short on time, you do not have to make the actual calculation).
5. Suppose $\beta(1+r) = 1$. Discuss the effect of a (permanent) increase in A on the levels of consumption, leisure and hours worked. Under what conditions will hours worked be unaffected?
6. Keep the assumption that $\beta(1+r) = 1$. Suppose that the productivity factor is constant over time equal to A , except for a deviation in period 0, where it is A_0 . Discuss what the level of A_0 means for the consumption, leisure and hours in period 0, and in future periods.
7. Describe how the discussion above is related to how real-business-cycle theory attempts to explain fluctuations in employment.
8. Why does it seem more difficult to generate substantial fluctuations in employment in the simplest real-business-cycle models than it may appear from the answers to question 5 above?

9. Explain *briefly* why as a first approximation $\beta(1+r) = 1$ may be a reasonable assumption if the economy can be described by a neoclassical model where agents have infinite horizons and there is no underlying trend growth and the focus is on the long-run.
10. Explain how productivity shocks are usually measured when real-business-cycle models are quantified.