



## Macroeconomic Theory (8107)

### Spring 2007, Mini 1

#### Problem set 1

Due Thursday, Jan 25

1. Problem 4.B.2 Mas-Colell, Whinston and Green
2. Problem 8.1 Sargent Ljungqvist
3. Consider a discrete time closed economy with two infinitely lived consumers and two possible states of the world. In state 1 (boom) the total endowment is  $1+\varepsilon$ , in state 2 (recession) the total endowment is  $1 - \varepsilon$ . In each period the probability of the high state is  $p$ . Consumer 1 receives a constant share  $\gamma$  of the total endowment and the remaining goes to consumer 2.
  - (a) Calibrate  $p$  so that the economy has an average duration of recession of 2 periods.
  - (b) Consider the case in which the two consumers have identical preferences given by

$$E \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\sigma}}{1-\sigma}$$

Show that in this case price of any assets are independent of  $\gamma$ . Assume  $\sigma = 5$  and  $\varepsilon = 0.01$ . Plot the average real risk free rate in the economy, i.e. the return on an asset that pays one unit of consumption for sure next period as a function of  $\beta$ . Pick  $\beta$  so to match a risk free rate of 1%. For this  $\beta$  compute the average return on stocks, i.e. the return on an asset that pays a constant share of the aggregate endowment every period. Compute the equity premium i.e. the difference between the stock and the bond return. Repeat the exercise using  $\varepsilon = 0.02$  (with  $\sigma = 5$ ) and  $\sigma = 10$ . (with  $\varepsilon = 0.01$ ). Briefly comment your results.

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- (c) Now assume that consumers have heterogeneous preferences and that consumer 1 has a risk aversion of 4, while consumer 2 has a risk aversion of 2. Show that in this case the representative agent result does not apply, i.e. asset prices depend on  $\gamma$ . Compute equilibrium allocations (using the Negishi algorithm) for  $\gamma = 0.5$  and for  $\gamma = 0.8$ . Compute average equity premia in the two economies (always calibrate  $\beta$  to match the risk free rate). Briefly comment your result. What happens to equity premium when you increase the wealth of the more risk averse agent.