Problem Set 3: Due Friday, April 2, 2004

1. In their paper, “The Inflation Tax in a Real Business Cycle Model,” p. 738 Cooley and Hansen state that “it is not possible to invoke the second welfare theorem to compute an equilibrium for the economy studied in this paper.”

   (a) Explain what it means to “invoke the second welfare theorem” to compute an equilibrium. Exactly what calculations are the authors referring to?

   (b) Explain (it possible, using equilibrium conditions for the model stated in the paper) why these calculations will not locate an equilibrium for the model of this paper.

2. Consider an economy consisting of a large and equal number (each of mass 1) of two types (called odds and evens) of infinitely lived agents. There is a single non-storable type of consumption good. In this economy each agent does NOT receive an endowment stream. Instead at time zero ‘odd’ agents own a stock which pays a dividend, \( \delta_{o}(t) \), equal to one unit of the consumption good each odd period: That is,

   \[
   \delta_{o}(t) = \begin{cases} 
   1 & \text{if } t \text{ is odd} \\
   0 & \text{if } t \text{ is even}
   \end{cases}
   \]

   Similarly at time zero, ‘even’ agents own a stock which pays a dividend, \( \delta_{e}(t) \), equal to one unit of the consumption good each even period: That is,

   \[
   \delta_{e}(t) = \begin{cases} 
   0 & \text{if } t \text{ is odd} \\
   1 & \text{if } t \text{ is even}
   \end{cases}
   \]

   As in the previous problem, agents of type \( i \) wish to maximize:

   \[
   \sum_{t=0}^{\infty} \beta^{t} \ln c_{i}^{t}, \quad i = \text{odd, even}, \quad \beta \in (0,1)
   \]

   where \( c_{i}^{t} \) is the time \( t \) consumption of the single good by an agent of type \( i \). Assume all borrowing and lending is prohibited, but agents can trade in stocks.

   (a) Write down each agents’ maximization problem including the budget constraint(s).

   (b) Define an equilibrium for this economy with a stock market.

   (c) Compute the consumption allocation and stock price paths for this equilibrium. Compare the allocation of this stock market economy with that of the corresponding Arrow-Debreu economy discussed in class.

3. INSIDE MONEY, Ljungqvist-Sargent, page 566, Exercise 18.9; (second edition, page 851, exercise 24.9)