ECON 200A
Spring 2008

Assignment #4
Due Monday, April 14th

1. **Business Cycle Data**
   This question requires that you gatherdata and use a few different detrending methods to extract the cyclical components of key macroeconomic time series. For this question, you MUST refer to the How to Present Data supplement (from Week 1 of the course) in preparing your graphs and tables. This question is designed to familiarize you with identifying the cyclical component of macroeconomic variables AND how to present this information.
   You will be obtaining data on output, consumption and investment. To answer the questions below, you will need to obtain the following quarterly time series. All should be quarterly, seasonally adjusted at annual rates (SAAR), and available 1947:1-present.

   - Real Private Fixed Investment
   - Real Personal Consumption Expenditures
   - Real Gross Domestic Product
   - Aggregate Weekly Work Hours Index: Total Private Industries[1]

   (a) For the (log of) the investment series, use each of the following techniques to identify the cyclical component of investment:

       1. Quadratic trend
       2. HP filter
       3. Baxter-King Band Pass filter
          Graph each of the filtered series (on one graph). Comment on the differences in the techniques.

   (b) For the remainder of this question, use the band pass filtered series as the accurate measure of the cyclical component. Using the band-pass filter, construct the cylical measures of the remaining variables: consumption C, output Y, and work hours L. Then, construct a measure of productivity (Y/L) using the cyclical series. Using these data, construct a table similar to Romer's Table 4.4. In your table, report the figures from Romer text (for the U.S. data), your figures (from the series you constructed above), and the RBC model (from Hansen and Wright, 1992)

   (c) Compare and contrast your figures to those of Romer (for the U.S. data). Are the general conclusions the same? Why are the figures different? Cite two reasons why the figures differ.

   (d) Based on the information in your table, what are the two primary failings of the standard RBC model? Explain the mechanism through which each of these works in the standard model.

---

[1]This is a monthly time series. You will need to convert the series to the quarterly frequency. To do this, create a monthly workfile, then import the work hours series into the monthly workfile. Then, simply copy and paste this series into your quarterly workfile (with the output, investment, and consumption series) - EViews will convert the data for you.

2. **Standard RBC Model and Labor Supply**
   This question considers the standard RBC model from class. Suppose the household lives for two periods and maximizes lifetime utility:

   $$U = \ln(c_t) + A \ln(1 - \ell_t) + \beta E_t \left[\ln(c_{t+1}) + A \ln(1 - \ell_{t+1}) \right]$$

   subject to the lifetime budget constraint:

   $$c_t + E_t \left[\frac{c_{t+1}}{(1 + r_{t+1})} \right] = w_t \ell_t + E_t \left[\frac{w_{t+1} \ell_{t+1}}{(1 + r_{t+1})} \right]$$

   where A is a constant (unrelated to technology).

   (a) Set up the household utility maximization problem and find the FOCs for this problem.

   (b) Using your FOCs, find the Euler equation.

   (c) Using your FOCs, express the current marginal utility of consumption as a function of the marginal disutility from working (e.g., the marginal utility from leisure). Discuss the meaning of this expression in terms of the household's labor supply decision and draw a graph with current consumption as a function of leisure time $(1 - \ell_t)$

   (d) Using the McGrattan (1994) RBC Model, generate an impulse response to a two-standard deviation ($\varepsilon = $ -0.014) *negative* technology shock. Report the impulse responses for output, consumption, work hours, and productivity. According to the RBC model, how do work hours and productivity behave during a recession?

3. **Hansen (1985)**
   This question considers a variant on the model from the previous question. Assume the problem is the same, except now the household's lifetime utility is defined as:

   $$U = \ln(c_t) + A(1 - \ell_t) + \beta E_t \left[\ln(c_{t+1}) + A(1 - \ell_{t+1}) \right]$$

   Here, leisure is a linear in the utility function.

   (a) Repeat steps (a) - (b) from the previous problem.

   (b) Repeat step (c) from the previous problem. [HINT: There is a corner solution here]

   (c) Compare how the household responds to a technology shock in the standard RBC model, versus Hansen's model. In thinking about how households make labor supply decisions, which specification for the utility function do you believe is more realistic? Explain.

   (d) In Question 1 you discusses two failings of the RBC model in replicating some key features of the data. In Question 2(d), you analyzed how the economy responds to a negative technology shock. Which one of these problems does the Hansen (1985) model address? Explain briefly why.

4. **Spending Shocks**
   Consider the following deterministic, closed-economy version of an IS/MP/IA model:

$$IS \quad : \quad Y = C(Y - T) + I(r) + G + \varepsilon_{IS}$$
$$MP \quad : \quad r = r(Y, \pi) + \varepsilon_{MP}$$
$$IA \quad : \quad \pi = \pi(Y - \bar{Y}) + \varepsilon_{IA}$$

(a) Derive the slopes of the IS and MP curves.

(b) Derive the slope of the IA curve. Illustrate the IS/MP/IA model on the appropriate graphs.

(c) Using your answers from part (a) and (b), interpret how each of the following would affect the slope of the IS, MP, or IA curves:

   - The central bank responds only to changes in inflation and not output.
   - Inflation is relatively inelastic (with respect to output).
   - Investment demand is more sensitive to changes in the cost of capital.

(d) Suppose there is a decrease in government spending. Compute the change in output, interest rates, and inflation.

(e) Illustrate the effects of the shock in part c) on an IS/MP/IA diagram.

(f) Now, suppose that the central bank responds only to changes in inflation, not to changes in income. Illustrate a new IS/MP/IA model imposing this assumption.

5. **Monetary Shocks**
   Consider the model given in the previous question.

(a) Suppose there is a positive monetary shock ($\varepsilon_{MP} < 0$). Compute the change in output, interest rates, and inflation.

(b) Illustrate the effects of the shock in part b) on an IS/MP/IA diagram.

References
Hansen, G. (1985). Indivisible labor and the business cycle. *Journal of Monetary Economics,* 16(3), 309-327.
McGrattan, E. (1994). A progress report on business cycle models. *Quarterly Review,* Federal Reserve Bank of Minneapolis, Fall, 2-16.
Romer. D. (2006). *Advanced macroeconomics* (3rd ed.). New York: McGraw-Hill Irwin.