UNIVERSITY OF CALIFORNIA
DEPARTMENT OF ECONOMICS

Economics 134
Spring 2018
Professor David Romer

PROBLEM SET 1

DUE AT THE *BEGINNING* OF LECTURE ON WEDNESDAY, FEBRUARY 7TH

You may work together on the problems, but your answers must be ***in your own words*** and ***handwritten***. You also must ***list the other students with whom you worked***.

Unless noted otherwise, be sure to explain your answers and to use graphs whenever appropriate.

1. Describe how, if at all, each of the following developments affects the real interest rate and output in the short run (or whether it is not possible to tell). In parts (a) and (b), use the information in the question to decide what assumption to make about how monetary policy is being conducted. In part (c), assume that the central bank is following an interest rate rule.

- **a.** The central bank changes its monetary policy rule so that it sets a lower level of the real interest rate at a given level of output than before.
- **b.** The central bank raises its target for the money stock.
- **c.** The government increases taxes and government purchases by equal amounts.

2. Our baseline model assumes that consumption is determined by disposable income: $C = C(Y - T)$, with the function increasing. But the real interest rate may also affect households' choice between consumption and saving. This problem therefore asks you to consider the implications of some alternative assumptions. Throughout, assume that the central bank is following an interest rate rule.

- **a.** Suppose $C = C(Y - T, r)$, with C a decreasing function of r. With this change in the model, does an increase in G increase C, decrease it, or leave it unchanged, or is it not possible to tell?
- **b.** Suppose there are two types of consumption. One (for example, long-lived goods such as cars) is determined by the real interest rate, and the other (for example, short-lived goods such as restaurant meals and vacations) is determined by disposable income. Thus we write $C = C^A(r) + C^B(Y - T)$, where C^A and C^B are the two types of consumption. C^A is assumed to be a decreasing function of r, and C^B is assumed to be an increasing function of Y – T. With this change in the model, how does an increase in G affect each type of consumption (or is it not possible to tell)?

3. (The econometrics of supply and demand.) Suppose your goal is to estimate the elasticity of demand for blueberries. Your model of blueberry demand is $\ln Q_t = a - b \ln P_t + e_t$, where Q_t is the quantity of blueberries bought and sold in month *t* and P_t is the price of blueberries in month *t*. (The reason for entering the variables in logs is that we are interested in estimating the elasticity of demand rather than the slope of the demand curve. The reason for the minus sign, which is not essential, is that because we think demand depends negatively on price, it makes the equation easier to interpret.) You are considering trying to estimate *b* by an ordinary least squares regression of $\ln Q_t$ on a constant and $\ln P_t$.

- **a.** The condition for a regression to give us a good estimate of the impact of the independent variable on the dependent one is that the residual is not systematically correlated with the independent variable. Is there likely to be systematic correlation between e_t and $\ln P_t$? (Hint: Your answer should involve supply and demand diagrams and discussing the effects of shifts of one or both curves.)
- **b.** Suppose that in addition to data on *Q* and *P*, you have data on two other variables. The first, *X*, is a variable (such as the weather in blueberry-growing areas) that shifts the supply curve of blueberries but is not systematically correlated with factors that shift demand. The second, *Z*, is a variable (such as income in blueberry-consuming areas) that shifts the demand curve for blueberries but is not systematically correlated with factors that shift supply. Suppose you were going to use either *X* or *Z* as an instrument and estimate the regression by instrumental variables rather than ordinary least squares. Which one would you use, and why?

4. Is the following statement True, False, or Uncertain? "From 2007 to 2009, the Federal Reserve cut its target for the federal funds rate sharply, and the stock of high-powered money grew enormously. Yet real output plummeted. This provides strong evidence that expansionary monetary policy does not raise real output." (As usual, make sure to explain your answer.)

5. This problem asks you to compare the recovery from the Great Recession with the recoveries from the three largest postwar recessions before the Great Recession (1957–58, 1973–75, 1981–82). The troughs of these four recessions (as measured by real GDP) occurred in 1958:Q1, 1975:Q1, 1982:Q1, and 2009:Q2. Make sure to explain where you obtained your data.

- **a.** Find the average annual growth rate of real GDP in the 8 quarters after the trough of each recession.
- **b.** Find the change in the unemployment rate, in percentage points, over the 8 quarters after the trough of each recession.
- **c.** Repeat the calculations in part (a) for the residential investment part of real GDP.
- **d.** Based on your answers to (a)-(c), would you agree or disagree with the claims that the recovery from the Great Recession has been unusually slow, and that housing has not played its usual role in driving recovery?

(Note: (1) If x_0 and x_1 are the levels of some variable N quarters apart, the two ways economists might compute the average annual growth rate of x over those N quarters (which will give slightly different answers) are $100 * \left[(x_1/x_0)^{4/N} - 1\right]$ and $400 * [\ln(x_1) - \ln(x_0)]/N$. You may use either formula. (2) If a series is only available monthly, you can compute quarterly figures by averaging the observations for the 3 months of the quarter.)

Pick the best answer to each of questions 6-8. No explanations of your answers are needed.

6. A large part of the portion of the Chapter 2 of the 2010 *Economic Report of the President* that you read is devoted to:

- **a.** Discussing the evidence about whether the policy response to the Great Recession was important to stabilizing the financial sector and causing output to start growing again.
- **b.** Comparing macroeconomic volatility in the two decades before the Great Recession and in the decades before the Great Depression
- **c.** Discussing policies to raise long-term productivity growth
- **d.** Comparing the Great Recession in the United States with earlier U.S. recessions and with the Great Recession in other major countries.

7. The following periods are listed in order from least to greatest macroeconomic volatility:

- **a.** 1886–1916, 1947–1985, 1985–2005.
- **b.** 1886–1916, 1985–2005, 1929–1941.
- **c.** 1985–2005, 1947–1985, 1929–1941.
- **d.** 1985–2005, 1929–1941, 1947–1985.
- **e.** None of the above.

8. In deciding whether to use the IS-MP or model or the IS-LM model to analyze some historical episode, a good guide is to:

- **a.** Use IS-MP if the central bank was following an interest rate rule; use IS-LM if the central bank was targeting the money supply.
- **b.** Use IS-LM if there were developments in the episode (such as a shift in the money demand function) that affected the money market; otherwise use IS-MP.
- **c.** Use IS-LM if there was a shift either of the consumption function, C(Y – T), or of investment demand, I(r); otherwise use IS-MP
- **d.** Always use both models.