Economics 314 **Spring 2011**
Project #6 Assignment **Due: 9am, Thursday, March 31**

Partner assignments

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Note: This assignment is due the week after spring break. It may be somewhat more difficult to coordinate with partners during this period, so this assignment will be due on Thursday morning rather than the usual Wednesday. If you have idle time during break and are missing macroeconomic analysis, you might want to try to get a start on these problems on your own before coordinating with your partner after break. However, there should be ample time to complete the problems without eating into your well-earned break time!

1. Work Romer's Problem 4.8. The following hints should be useful:
   - Note that A is the marginal product of capital, so it plays the role of the interest rate.
   - Use the equation of motion for capital to show that if the present value of terminal capital goes to zero at an infinite horizon, $(1+A)K_0 + \sum_{t=0}^{\infty} \frac{e_t - C_t}{(1+A)^t} = 0$. This is the lifetime budget constraint of the households.
   - Follow the analysis of Romer's page 185 to derive the Euler equation in part (a), using the utility function given in the problem and the budget constraint above. Your Euler equation will be simpler than the one in the text. Be sure to keep future marginal utility in "expectation" form.
   - In part (c), you will get an equation with linear functions of K_t and e_t on both sides. The coefficients of these linear functions will involve α, β, γ, and $A = \rho$. If, as Romer says, the equation is to be satisfied "for all values of K_t and e_t," then each of the coefficients on the left side must equal the corresponding coefficient on the right side. (This solution method is usually called the "method of undetermined coefficients." It relies on making a good guess in part (b).)
   - There are actually two solutions in part (c), but one of them is uninteresting because $\beta = \gamma = 0$ and α is indeterminate. Work on the other solution.

2. Suppose that equilibrium in the Keynesian-cross model is written as $Y = E \equiv \Phi(Y - T, r) + G$, where the Φ function represents desired private expenditures ($C + I$). Suppose that $m = \dfrac{\partial \Phi}{\partial (Y - T)}$ is a positive constant that is less than one.

a. What is the slope of the desired expenditure function (the *E* curve in Romer's Figure 5.1)? Is it constant?
b. How much does a one-unit increase in *G* raise *E* (and thus *Y*) directly? How does it affect the *E* curve?
c. Given this direct increase in *Y* due to the rise in *G*, how much will people raise spending at the second round? Given that second-round increase in *Y*, how much will spending go up in the third round?
d. How much does a one-unit increase in *G* raise the eventual equilibrium level of *Y*? In other words, what is the government-expenditure multiplier $\dfrac{dY}{dG}$? How does this result relate to the formula for the geometric series: $\sum_{i=0}^{\infty} x^i = \dfrac{1}{1-x}$, where $0 < x < 1$?
e. By how much does the unit increase in *G* shift the *IS* curve? Why?
f. If *m* differs between two countries, how will their multipliers differ? Explain both in terms of the equation and in intuitive terms.
g. What happens if $m > 1$?

3. Use the *IS*/*MP* model to analyze the following situations. For each situation, tell which (if either) curve would shift which direction and why. Describe the effect this would have on the model in verbal terms. Characterize the eventual effects on quantity of output demanded (equilibrium *Y*) and the real interest rate.

a. A strong "inflation hawk" is installed as central-bank chair and embarks on a mission to lower inflation.
b. Economic recovery in Europe raises the demand for American exports. (Do not use the full Mundell-Fleming model for this one.)
c. Congress raises taxes to lower the deficit, but consumers are infinitely lived utility maximizers who recognize the government budget constraint tying lifetime spending (which is unchanged) to lifetime taxes. In other words, consumers are "Ricardian."
d. Congress raises taxes to lower the deficit, but consumers are not Ricardian.
e. Forecasts of a recession cause households' expected future levels of income to fall and businesses' expected marginal product of capital to fall.

4. Suppose that everyone expects the price level to fall at a rate of 5 percent per year: $\pi^e = -5\%$.

a. What is the real interest rate if the nominal interest rate approaches zero?
b. Can the nominal interest rate ever be less than or equal to zero in equilibrium? Why? (Hint: Would anyone willingly hold bonds if their return was less than or equal to that of money? This situation is sometimes called a "liquidity trap" or the "zero lower bound.")

c. What range of values is feasible for the central bank in setting the nominal interest rate i? Does this restrict the feasible range at which it can set r? How would you represent this in the *MP* curve?
d. Suppose that a large contraction in desired expenditures pushes the *IS* curve far to the left so that the nominal interest rate becomes small. Why is it infeasible to use monetary policy to moderate the effect on output or to reverse it?
e. Do the limitations on monetary policy apply to fiscal policy?