Economics 314 | Spring 2010
Project #8 Assignment | Due: 9am, Wednesday, April 14

Partner assignments

Axcelle Bell	Ximeng Zhang
Nisma Elias	Mrijan Rimal
Antonio Friedman	Mark Hintz
Zakir Hakim	Gabriel Korzeniewicz
Niall Murphy	Suraj Pant
Nicholas Wilson	

1. **Macroeconomics of tariff policy.** Countries sometimes use tariffs to attempt to improve their trade balance (net exports) and stimulate aggregate demand. Suppose that desired domestic expenditures are given by

$$E = \alpha_0 + \alpha_Y Y - \alpha_r r.$$

Net exports are

$$NX = \beta_0 + \beta_\varepsilon \varepsilon + \beta_\tau \tau,$$

where τ is the rate of tariff imposed by the domestic country on imports. Net capital inflows are

$$CF = \lambda\left(r - r^*\right).$$

Domestic monetary policy is given by a real-interest-rate rule as

$$r = \mu_0 + \mu_Y Y + \mu_\pi \pi.$$

Equilibrium in the domestic economy requires that $Y = E + NX$. Equilibrium in international payments requires $NX + CF = 0$. We will consider τ and r^* to be exogenous; all other variables are endogenous. Consider a short-run situation in which $\pi = \bar{\pi}$.

a. In equilibrium, what effect will an increase in the tariff rate have on domestic output, the real exchange rate, and net exports? (Be sure that you solve the model *completely* before taking the appropriate partial derivatives.)
b. Will the tariff increase improve the trade balance? Will it stimulate domestic output? Explain the logical intuition of this result in detail.

c. What value of λ would be associated with perfect capital mobility? Would this change the results of part (b)?
d. How, if at all, would the results of part (b) be different in the long run when π is variable and $Y = \bar{Y}$?

For problems 2 and 3, we shall construct macro models from the following equations:

DE: $E = \alpha_0 + \alpha_Y \left(Y - T\right) - \alpha_r r + G$
KC: $Y = E$
LM: $m - p = \beta_0 + \beta_Y Y - \beta_r \left(r + \pi^e\right)$
MP: $r = \gamma_0 + \gamma_Y Y + \gamma_\pi \pi$
CAS: $Y = \bar{Y}$
KAS: $p = \bar{p}$ or $\pi = \bar{\pi}$

The Greek letters α, β, and γ with various subscripts are positive coefficients, with $\alpha_Y < 1$. *G*, *T*, and π^e are exogenous. $\bar{Y}$ is the full-employment level of output and is exogenous. $\bar{p}$ and $\bar{\pi}$ are the predetermined levels of prices and inflation in a fixed-price model and are exogenous. The constant terms are "shift parameters" that reflect the effects of all other (exogenous) factors. For example, an increase in desired spending due to more optimistic expectations about the future (or anything else other than disposable income, the real interest rate, or government spending) would cause an increase in α_0.

Note on solving models: One of the most difficult things for young, budding macroeconomists to learn is how to recognize when they have (and have not) solved a model. Solving a model means expressing the values of the endogenous variables (some or all) as functions *only* of the exogenous variables. If there is still an endogenous variable on the right-hand side of the equation, you have not solved it yet; you are still looking at a partial effect holding other endogenous responses fixed, not the complete effect. For example, if you were asked to calculate the effect of *G* on *Y*, you could *not* simply substitute the DE equation into the KC equations above and say that $\partial Y/\partial G = 1$. This is because other endogenous variables (*r* and *Y* itself) appear on the right-hand side of DE. To calculate the effects of *G* on *Y*, you would need to solve the *Y* out of the right-hand side and use one or more other equation(s) to eliminate *r*. Once you get an expression for *Y* that involves only exogenous variables, you have what is called a *reduced-form* equation. This equation is a solution for *Y*. If it is linear, then the effects of exogenous variables on *Y* are just the expressions by which those variables are multiplied in the linear equation. If an exogenous variable does not appear in the reduced-form equation for *Y*, then that exogenous variable does not affect *Y*.

The mathematical analysis gives you a formula for the effect of one variable on another. The mathematics is important to establish whether we can determine with certainty (based on our assumptions) whether an effect is positive or negative. Even more important is understanding the economic intuition of the results. Whose behavior changes and why? What are the connections that link the change in the exogenous variable to the ultimate change in the endogenous variable? Which parameters of the model are crucial in that chain? These are the kinds of considerations that should be discussed in your explanations of intuition on these problems.

2. The basic *IS/LM* model

The basic *IS/LM* model consists of equations DE, KC, and LM with m assumed to be the exogenous monetary-policy instrument.

(a) Solve the three equations of the *IS/LM* model for the aggregate demand curve expressing Y as a function of p and exogenous variables. Show that the AD curve slopes downward.

(b) Combining the AD curve based on the *IS/LM* model with the static form of the KAS curve, solve the model for Y and r as functions of G, T, m, π^e, $\bar{p}$, and the parameters of the model.

(c) Use the results of part (b) to evaluate whether each of the following is true of false, using both mathematical analysis and *also explaining the intuition of the result*:

- (i) An increase in α_Y would increase the impact of G on Y.
- (ii) An increase in m affects Y and r.
- (iii) An increase in the interest-sensitivity of money demand would increase monetary policy's impact on Y and r.
- (iv) A decrease in the overall level of the demand for money, such as might result from having more convenient ATMs and online banking, would affect Y and r. If the central bank wanted to neutralize this effect, it should lower m.
- (v) An increase in the expected rate of inflation would raise the nominal interest rate by an equal amount, leaving the real interest rate unchanged (the Fisher hypothesis).

(d) Now combine the AD curve from the *IS/LM* model with the classical CAS curve, solving the model for r, and p as functions of G, T, m, π^e, $\bar{Y}$, and the parameters of the model.

(e) Use the results of part (d) to evaluate each of the following, *explaining the intuition of the result*:

- (i) An increase in m lowers r and raises Y and p.
- (ii) An increase in G has similar effects (i.e., the same sign) on r, Y, and p as in the model of part (b).
- (iii) An increase in G "crowds out" (lowers) private spending by an equal amount.
- (iv) An increase in expected inflation π^e raises the current price level p.
- (v) An increase in the expected rate of inflation would raise the nominal interest rate by an equal amount, leaving the real interest rate unchanged (the Fisher hypothesis).

3. The *IS/MP* model

The *IS/MP* model consists of equations DE, KC, and MP. If we want to know what happens to m, we add the LM equation and consider m an endogenous variable. Otherwise m does not enter into the model.

(a) Solve the three equations of the *IS/MP* model for the aggregate demand curve expressing Y as a function of π and exogenous variables. Show that the AD curve slopes downward.

(b) Solve the *IS/MP* model together with the inflation form of the KAS curve with r and Y as the endogenous variables.

(c) Use the results from part (b) to examine each of the following, *explaining the intuition of the result*:

  (i) How would a change in the monetary-policy rule to become more expansionary (a decrease in γ_0) affect r and Y? Compare these effects to those of an increase in m in the *IS/LM* model.

  (ii) If the aggregate-demand curve is to slope downward, then an increase in π should lower the equilibrium Y. Is this true in this model? Discuss the mechanism through which this happens and compare it to the *IS/LM* model.

(d) Now solve the *IS/MP* model with the classical CAS curve treating r and π as endogenous.

(e) Use the results from part (d) to answer the following, *explaining the intuition of each result*:

  (i) How would a positive productivity shock (an increase in $\bar{Y}$) affect r and π? How does the effect on r compare with the effect predicted in the real-business-cycle model?

  (ii) Suppose that the monetary authority sets the real interest rate based solely on the level of real output ($\gamma_\pi = 0$). What is the slope of the aggregate-demand curve? Is there a unique equilibrium value of π? Explain. What will happen if the central bank's target value of Y is greater than $\bar{Y}$?