Homework #5
Macro Policy Analysis
Due Mar 25

1. Using the IS-LM model for a closed economy and the Mundell-Fleming model for an open economy (always in the short run, with a fixed price level), derive and compare the effects of a tax cut for the three regimes of

   CE: A **C**losed **E**conomy
   FE: A small open economy with a **F**loating **E**xchange rate
   PE: A small open economy with a **P**egged **E**xchange rate

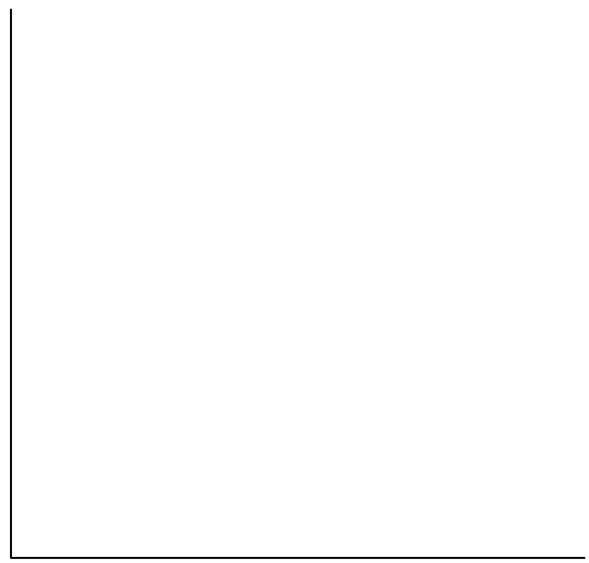
   Consider the effects of a given tax cut on

   i. GDP (Y)
   ii. the interest rate (r)
   iii. the level of demand for money (L), and
   iv. the level of consumption (C).

   Derive, for each of these, both the direction of the effect on the variable and how it compares in size to the effects under the other two regimes.

   To do all this, follow the steps listed on the next several pages.

a. On the axes below, draw and label the appropriate diagram for showing the effects of a tax cut in a **closed economy**. Then record, below that, the direction (+, –, 0, ?) of the changes in each of the variables listed above, together with reasons for these changes. ("From the diagram" is an acceptable reason, if appropriate.)



Y ______________ Why?

r ______________ Why?

L ______________ Why?

C ______________ Why?

b. Draw and label the appropriate diagram for showing the effects of a tax cut in a **small open economy with a floating exchange rate**. Then record, below that, the direction (+, –, 0, ?) of the changes in each of the variables listed above, together with reasons for these changes.

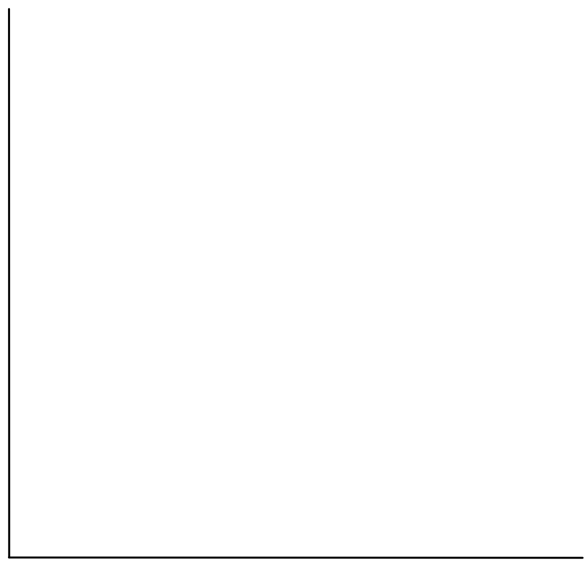
Y ______________ Why?

r ______________ Why?

L ______________ Why?

C ______________ Why?

c. Draw and label the appropriate diagram for showing the effects of a tax cut in a **small open economy with a pegged exchange rate**. Then record, below that, the direction (+, –, 0, ?) of the changes in each of the variables listed above, together with reasons for these changes.



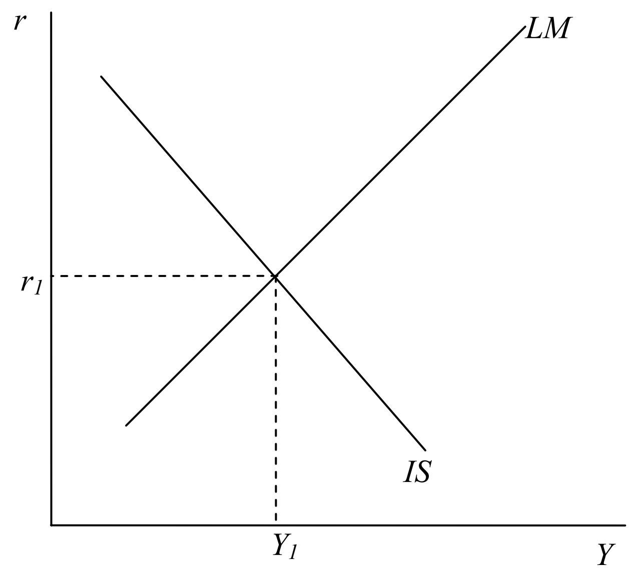
Y _______________ Why?

r _______________ Why?

L _______________ Why?

C _______________ Why?

d. Starting with the IS-LM equilibrium shown below, show how the IS and LM curves are shifted by the time you get to a new equilibrium in **all three** of the cases above. That is, identify the final IS and LM curves for each of the cases, labeling them IS_{CE} and LM_{CE} for the closed economy case, IS_{FE} and LM_{FE} for the floating exchange rate case, and IS_{PE} and LM_{PE} for the pegged exchange rate case. Then use these curves to identify, in the same figure, the equilibrium combinations of *Y* and *r* for each case, marking them CE, FE, and PE



respectively.

e. For each of the variables that you examined in parts a-c, indicate how the changes compare, to each other and to zero, across the three regimes. For example, if it were the case that variable *X* increases the most in a closed economy, next most with a pegged rate, and not at all with a floating rate, then you would write:

$$\Delta X_{CE} > \Delta X_{PE} > \Delta X_{FE} = 0$$

If *X* changes by the same amount in two regimes, use "="instead of ">" or "<".

Ranked changes in *Y*: ______________________________

Ranked changes in *r*: ______________________________

Ranked changes in *L*: ______________________________

Ranked changes in *C*: ______________________________

2. You are advisor to the government of a small open economy with a floating exchange rate. The government has control over both monetary and fiscal policies, and it has come to you for advice on how to achieve one of the following objectives in the short run (it is up for reelection next year and does not care about the long run). What do you tell it in each case?

   a. Reduce unemployment

   b. Cause its currency to appreciate.

   c. Lower its interest rate.

   d. Raise GDP **and** appreciate the currency.

   e. Prevent a rise in the world interest rate from causing any change in domestic income.

3. Use the sticky-wage model of the short-run aggregate supply curve to work out the effects of the following changes on that curve:

    a. An increase in the target real wage, ω .

    b. An improvement in technology that increases both the marginal and the average product of labor by 5%.

4. The following equations represent more or less the same aggregate supply and demand model that you examined numerically in Homework #2.

LRAS:	$\bar{Y} = 100$	(1)
AD:	$Y_t = 100 + X_t + M_t - P_t$	(2)
SRAS:	$P_t = P_t^e + a(Y_t - \bar{Y})$	(3)
Expectations:	$P_t^e = P_{t-1} + \pi_t^e$	(4a)
	$\pi_t^e = P_{t-1} - P_{t-2}$	(4b)
Monetary growth:	$M_t = M_{t-1} + m_t$	(5)
Policy Rule I:	$m_t = \bar{m}$	(6a)
Policy Rule II:	$m_t = m_{t-1} + b(\hat{Y} - Y_{t-1})$	(6b)

The main differences are that this model now includes an upward sloping SRAS curve, a role for expectations about prices and inflation, and two possible rules for monetary policy in terms of the rate of growth of the money supply, rather than just its level. (If you want these equations to make the most sense, think of M, P, P^e , and perhaps even Y, as being the logarithms of the respective variables.) Note that the simple expectations mechanism just sets an expected rate of inflation equal to last period's observed rate of inflation, and then uses that expected rate of inflation to set the current expected price level.

Policy Rule I sets a constant rate of monetary growth for all periods, a rate that could be zero. Policy Rule II sets a more active policy response based on a target level of income, $\hat{Y}$, which could be equal to $\bar{Y}$ but doesn't need to be. Whatever the target is, under this rule the monetary policy makers increase money growth when income is below the target and reduce it when it is above.

a. Before solving the model numerically (which you will do below), use your knowledge of the AD-AS model and the Phillips Curve to describe how you expect this economy to behave if, starting from a long-run equilibrium with constant prices, the monetary authorities now begin to increase the money supply at a constant positive rate from then on. You need not draw any diagrams for this, but you are welcome to.

b. In part (c) below you will be solving this model numerically. In order to do that, since the model includes two equations – (2) and (3) – that must be solved simultaneously, you will first need to find that solution analytically. In the space below, use equations (2) and (3) above to derive the following:

$$Y_t = \frac{1}{1+a}\left(100 + X_t + M_t - P_t^e + a\overline{Y}\right) \qquad (2')$$

$$P_t = \frac{1}{1+a}P_t^e + \frac{a}{1+a}\left(100 + X_t + M_t - \overline{Y}\right) \qquad (3')$$

c. Using the equations of the model with (2) and (3) replaced by (2') and (3') from part (b), calculate the values over time for ten periods of the variables indicated in the tables below. Presumably you will want to do this in a spreadsheet. As a check that you have entered the equations correctly into the spreadsheet, you should first calculate the results without any aggregate demand shocks (X=0) and without any monetary growth (m=0) for all periods. In that case you should find that all variables are constant at their initial values.

In each case, below the tables of results, write a short description of how the economy responds in the scenario. (You may want to extend your calculation beyond ten periods to help you see where it is going.)

i.) Response to a permanent positive shock to aggregate demand with no change in the money supply:

Parameters: $a = 1.0$

Period t	X(t)	m(t)	$\pi^e(t)$	$P^e(t)$	Y(t)	P(t)	M(t)
-2	0	0	0.00	100.00	100.00	100.00	100.00
-1	0	0	0.00	100.00	100.00	100.00	100.00
0	10	0					
1	10	0					
2	10	0					
3	10	0					
4	10	0					
5	10	0					
6	10	0					
7	10	0					
8	10	0					
9	10	0					
10	10	0					

Describe what happens:

ii.) Response to a permanent increase in the rate of growth of the money supply:

Parameters: $a = 1.0$

Period t	X(t)	m(t)	$\pi^e(t)$	$P^e(t)$	Y(t)	P(t)	M(t)
-2	0	0	0.00	100.00	100.00	100.00	100.00
-1	0	0	0.00	100.00	100.00	100.00	100.00
0	0	10					
1	0	10					
2	0	10					
3	0	10					
4	0	10					
5	0	10					
6	0	10					
7	0	10					
8	0	10					
9	0	10					
10	0	10					

Describe what happens:

iii.) Monetary authorities attempt to stabilize the economy in response to a permanent positive shock to aggregate demand (use (6b)):

Parameters: $a = 1.0$
$b = 2.0$
$\hat{Y} = \overline{Y} = 100$

Period t	X(t)	m(t)	$\pi^e(t)$	$P^e(t)$	Y(t)	P(t)	M(t)
-2	0	0	0.00	100.00	100.00	100.00	100.00
-1	0	0	0.00	100.00	100.00	100.00	100.00
0	10						
1	10						
2	10						
3	10						
4	10						
5	10						
6	10						
7	10						
8	10						
9	10						
10	10						

Describe what happens:

iv.) Starting in period 0, monetary authorities attempt to maintain a level of real output above its natural rate (use (6b)):

Parameters: $a = 1.0$
$b = 2.0$
$\hat{Y} = 110 > \overline{Y}$

Period t	X(t)	m(t)	π^e(t)	P^e(t)	Y(t)	P(t)	M(t)
-2	0	0	0.00	100.00	100.00	100.00	100.00
-1	0	0	0.00	100.00	100.00	100.00	100.00
0	0						
1	0						
2	0						
3	0						
4	0						
5	0						
6	0						
7	0						
8	0						
9	0						
10	0						

Describe what happens: