Professor Christiano
Economics 311, Winter 2004

First Midterm

IMPORTANT: read the following notes

- You may not use calculators, notes, or aids of any kind.
- A total of 60 points is possible, with the distribution by question indicated in parentheses.
- Explain your answers carefully in clear English.
- Write neatly and label all diagrams. We cannot give you credit if we cannot read your answer.

- Write your name here:

TA (circle one): David Helge Martin, Section (circle one): 12.00pm or 2:00pm

1. (7 pts) MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

   (a) (1 pt) Suppose there is no foreign sector. Which of the following conditions must be always be satisfied, regardless of whether the economy is in or out of equilibrium?

      i. government spending equals taxes
      ii. actual investment equals private saving
      iii. desired investment is equal to national saving
      iv. private saving equals desired investment
      v. none of the above

   (b) (1 pt) During the mid-1980s, we observed a significant reduction in oil prices. In the United States, we would expect that this drop in oil prices would cause:

      i. a larger reduction in the GDP deflator compared to the CPI.
      ii. a larger reduction in the CPI compared to the GDP deflator.
      iii. an equal reduction in the CPI and GDP deflator.
      iv. no change in the CPI and a reduction in the GDP deflator.

   (c) (1 pt) A firm's value added during the year is equal to its:

      i. revenue minus wages.
      ii. revenue minus wages and profit.
      iii. revenue minus all costs.
      iv. revenue minus wages and the cost of intermediate goods.
      v. revenue minus the cost of intermediate goods.

   (d) (1 pt) The paradox of saving suggests that an increase in the desire to save will cause:

      i. an increase in the desire to invest.
      ii. an increase in equilibrium GDP.
      iii. an increase in saving.
      iv. a reduction in GDP.
      v. no change in equilibrium GDP.

   (e) (1 pt) An economy produces turkey, bread and sandwiches. The turkey industry sells all of its production for \$1,000 to the sandwich industry. The bread industry sells \$1,000 of its production to the sandwich industry and the rest of its production for \$1,000 to a grocery store. The grocery store sells all of the bread for \$2,000 to consumers. The sandwich industry sells its turkey sandwiches for \$3,000 to consumers. No firm keeps any inventories. What is GDP?

      i. \$4,000
      ii. \$5,000
      iii. \$7,000
      iv. \$3,000
      v. \$4,100

(f) (1 pt) The value of an exogenous variable is:

i. determined by the equations of the theory at hand.
ii. determined by considerations outside of the theory.
iii. not important for the analysis at hand.

(g) (1 pt) When the Federal Reserve purchases U.S. government debt:

i. the stock of money in the economy decreases.
ii. the price of bonds falls and the interest rate rises.
iii. the amount of wealth in the economy changes.
iv. the relative composition of bonds and money in the financial markets changes.

Following are some equations relevant to this exam:

$$\begin{aligned} C^d &= c_0 + c_1 (Y - T), \\ G^d &= \overline{G} \\ T &= \overline{T} + t_1 Y, \ 0 \leq t_1 < 1 \\ I^d &= \bar{I} - b \times i + q \times Y \\ M^d &= P \times (Y + \bar{L} - L_1 \times i), \ L_1, \bar{L} > 0 \end{aligned}$$

The 'Keynesian Cross Model' corresponds to $t_1 = b = q = 0$.
The 'Standard IS-LM Model' corresponds to $b > 0$, $t_1 = q = 0$.
The exogenous parameters are c_0, c_1, $\bar{G}$, $\bar{T}$, t_1, $\bar{I}$, b, q, $\bar{L}$, L_1.

2. (24 pts) Consider the standard IS-LM model. (Where asked to use a diagram labelled "Question 2" at the end of this question)

   (a) (3 pts) Define equilibrium output in the goods market. Derive a formula that expresses equilibrium output in the goods market as a function of the exogenous parameters and of the rate of interest, i.

   (b) (3 pts) In the diagram labeled 'Goods Market' market, draw and label the 45 degree line and the total desired spending curve, indicate the slope and intercept of the latter. Label equilibrium output. Provide algebraic formulas for the slope and for the intercept terms.

   (c) (3 pts) Define equilibrium in the financial market. Derive a formula that expresses the equilibrium interest rate in the financial market, as a function of the exogenous parameters and of the level of output.

(d) (3 pts) In the diagram labeled 'Money Market', draw the money demand and money supply curves, indicate the slope and intercept of the money demand curve. Label equilibrium. Provide algebraic formulas for the slope and for the intercept terms.

(e) (12 pts) Consider the diagram labeled 'IS-LM'.

i. (2 pts) Define the IS and the LM curves using words. Explain intuitively (algebra for this is not needed) why the IS curve slopes down and the LM curve slopes up.

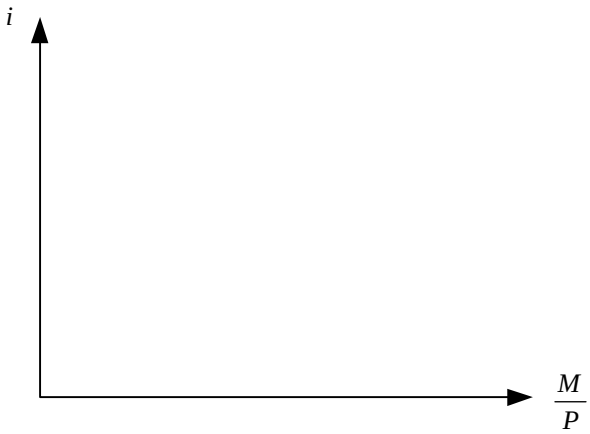
ii. (2 pts) What is the situation in the goods market for (i, Y) combinations that lie above the IS curve. What is the situation for points below the IS curve. Explain carefully.

iii. (2 pts) What is the situation in the financial market for (i, Y) combinations that lie above the LM curve. What is the situation for points below the LM curve. Explain carefully.

iv. (3 pts) Suppose $\bar{G}$ increases by $\Delta\bar{G} > 0$. Which curve shifts, the IS curve or the LM curve? Display an algebraic formula showing by how much the curve shifts in the horizontal direction. Explain how you obtained the formula.

v. (3 pts) Indicate the old and the new equilibria in the diagram. Explain carefully how the economy goes from the old to the new equilibrium. Be sure to state clearly the assumptions you make about disequilibrium dynamics.

Goods Market



Money Market

"IS-LM" Diagram

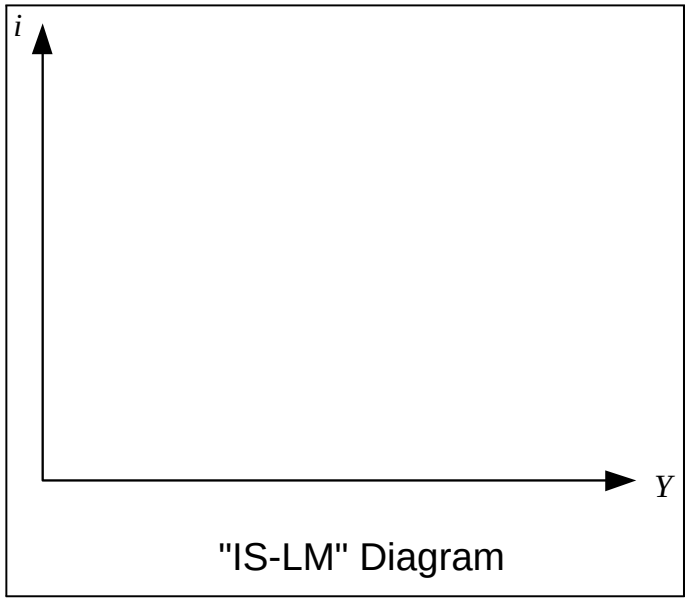
3. (12 pts) Define the investment multiplier as the amount that equilibrium output changes in response to a change in $\bar{I}$, divided by the change in $\bar{I}$.

   (a) (3 pts) Derive and display a formula for the investment multiplier in the 'Keynesian Cross' model.

   (b) (3 pts) Suppose the restriction, $t_1 = 0$, in the Keynesian Cross model is replaced by $0 < t_1 < 1$. Show algebraically how this change affects the investment multiplier. Provide intuition for your answer.

   (c) (3 pts) Suppose the restriction, $q = 0$, in the Keynesian Cross model is replaced by $q > 0$. Show algebraically how this change affects the investment multiplier. Provide intuition for your answer.

(d) (3 pts) Consider the investment multiplier in the version of the IS-LM model with $b = 0$ and the version with $b > 0$. Why is the investment multiplier smaller with $b > 0$ than with $b = 0$? Establish your point using the diagram below. Explain the intuition for your answer. (Algebra is not necessary.)



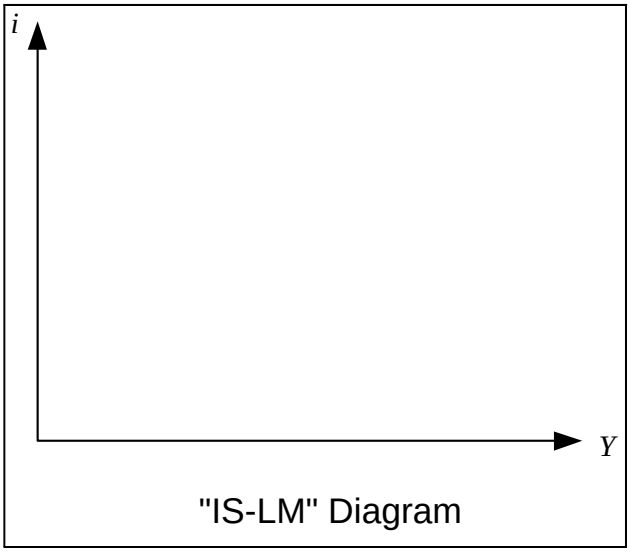
4. (4 pts) In the equation for desired investment,

   (a) (2 pt) explain why it might be that $q > 0$.

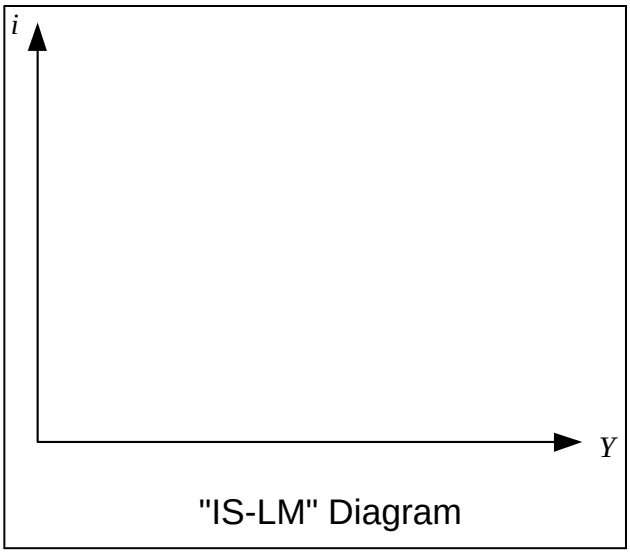
   (b) (2 pt) explain why it might be that $b > 0$.

5. (6 pts) In each of the following scenarios, explain what shock to the economy may be at work. Argue your case carefully using diagrams (algebra is not necessary).

   (a) (3 pts) the interest rate rises and output falls.



   (b) (3 pts) the interest rate and output both fall.



6. (2 pts) Suppose the economy is in an economic expansion. Suppose employment is not expanding and is possibly even contracting. How can you make sense of this?

7. (3 pts) Suppose that in some initial period 0, the Keynesian Cross model is in equilibrium. In the next period, period 1, the period 0 equilibrium level of output is produced. However, unexpectedly c_0 drops by \$10 in period 1. How much does desired saving change between period 0 and period 1? How much do actual and desired investment change between these two periods? Explain carefully.

8. (2 pts) Suppose money demand is given by $M^d = \$100 \times (1.05 - i)$. Suppose that money supply is \$100.What is the equilibrium rate of interest? Suppose wealth, W, is \$1,000. At the equilibrium rate of interest, what is the demand for bonds? Explain.