Professor Christiano
C-11, Fall 1997

Answers, First Midterm, for Paulo Santiago

1. When $\overline{G}$ decreases, the IS curve shifts left by $\Delta\overline{G}/(1-c_1)$, i.e., by the amount of the multiplier. When $b=0$, the IS curve is vertical and so equilibrium output falls by the full amount of the multiplier. The LM curve now just determines the interest rate and there is no feedback from this to the goods market. The impact on the goods market is what is predicted by the Keynesian Cross model. Because the fall in output is large, the interest rate drop must be large too, to clear the money market. The large income drop results in a large consumption drop. The investment drop is zero, of course, across the two equilibria. Desired investment is just a number, $\overline{I}$, and this does not change with the change in i.

   When $b>0$, then the IS curve is less steeply sloped. When the IS curve shifts left, the new intersection between the IS curve and the LM curve occurs with a smaller drop in Y than when $b=0$ (check this out by drawing a graph with the IS curve under $b=0$ and $b>0$). Consequently, the drop in C is smaller than when $b>0$. Also, the fall in the interest rate is not so great. Finally, I actually rises now.

   One way to see the reason for these different results is to focus on the Keynesian Cross diagram. As noted above, when $b=0$, the new equilibrium is the one predicted by just shifting the planned spending curve down by $\Delta\overline{G}$. However, when $b>0$, the interest rate reduction caused by the fall in Y actually stimulates the investment component of planned spending. This causes the planned spending curve to drop by less. The smaller fall in output gives rise to less of a need for the interest rate to fall to clear the money market.

2. This pattern is predicted to occur after an increase in the money supply. This would shift the LM curve to the right. The assumption that the money market clears instantly predicts that the interest rate drops right away to clear the money market. After the drop, the economy is off the IS curve, having fallen below it. This gives rise to an excess of planned spending over actual output, which encourages businesses to

start expanding production. The rise in production generates a rise in the interest rates as the increased output causes the quantity of money demanded to increase.

3. The pattern suggests that variations in $\overline{I}$ and some other variable, possibly c_0 or $\overline{G}$ are driving the data. Variations in $\overline{I}$ result in same-direction movements in i and I. Variations in c_0 or $\overline{G}$ cause i and I to move in opposite directions.

4. If $b = 0$, this is the Keynesian Cross model. Equilibrium occurs when $Y = c_0 + c_1(Y - T) + \overline{I} + \overline{G}$, or, $Y - T - c_0 - c_1(Y - T) = \overline{I} + \overline{G} - T$, or, $S(Y - T) = \overline{I} + \overline{G} - T$, where $S(Y - T)$ denotes the saving function, *i.e.*, $S(Y - T) = -c_0 + (1 - c_1)(Y - T)$. Note that the experiment involves no change in any part of $\overline{I} + \overline{G} - T$. This is why there cannot be any change in S in the new equilibrium. What happens with the fall in c_0 is that the resulting stimulus to saving is exactly offset in the new equilibrium by a sufficiently large fall in Y.

5. With $t > 0$, if c_0 increases, then the resulting rise in Y causes T to rise. This acts as a 'drag' on the economy, inhibiting the up-shift in the planned spending curve. As a result, the multiplier is reduced. Similarly, when c_0, the resulting fall in Y gives rise to a fall in T and there is offsetting stimulus to the planned spending curve. These offsetting movements in T resulting from $t > 0$ account for the fact that a tax system with $t > 0$ is called an 'automatic stabilizer' tax system.