Professor Christiano
Economics 311, Winter 2005
Solution to Midterm #1

1 Question 1

(a) (2) The internal rate of return of a project is the ratio of the net increase in revenues it is expected to generate in the future, divide by the price. The internal rate of return is used to decide whether a given project should be invested in. If the interest rate is higher than the internal rate of return on a project, do not invest in it, because it does not generate a high enough return. It would be better to take whatever money is used for the project and use it to buy an interest paying asset.

(b) (3) The national income identity is $Y = C + I + G + CA$. Rewriting this, $Y - C - G - I = CA$. But, $Y - C - G$ is national saving. So, the current account is the excess of national saving over domestic investment. The US current account has been falling since 1980. Algebraically, this must be due to a fall in national saving, or a rise in I or both.

(c) (2) Part of the value of a firm is the investment projects it has access to. Firms with high irr projects are profitable firms because their projects cost more than the funds needed to pay for them. The stock market gives the price of firms, of buying a piece of a firm. It is the value placed by the market on firms. If firms' irr falls, than a significant component of the value of firms falls. This will be reflected in a fall in the stock market.

(d) (3) a bond is a claim to a future payment, say p. The price of a bond, p_B, in effect is the price of p. The rate of return on a bond is defined as the payment it generates in the future, divided by the current price, i.e., the price of the bond. That is, the rate of return, i, is $i = p/p_B$. So, if p_B goes up, the rate of return, i, on the bond goes down.

(e) (2) the Federal Open Market Committee sends instructions to the open market desk to purchase bonds. This withdraws bonds from the economy and replaces them with money, when the bonds are paid for.

(f) (4) The vertical intercept is the interest rate that clears the goods market in the (unlikely!) case when $Y = 0$. The IS curve is the level of Y

such that Y equals planned spending:

$$Y = \frac{1}{1-c_1}\left[c_0 - c_1 T + \bar{G} + \bar{T} + \bar{I} - bi\right].$$

When $Y = 0$, then the object in square brackets is zero, so that

$$i = \frac{1}{b}\left[c_0 - c_1 T + \bar{G} + \bar{T} + \bar{I}\right].$$

This is the vertical intercept. The horizontal intercept is the equilibrium level of output, Y, in the goods market in the (unlikely) case when the interest rate is zero:

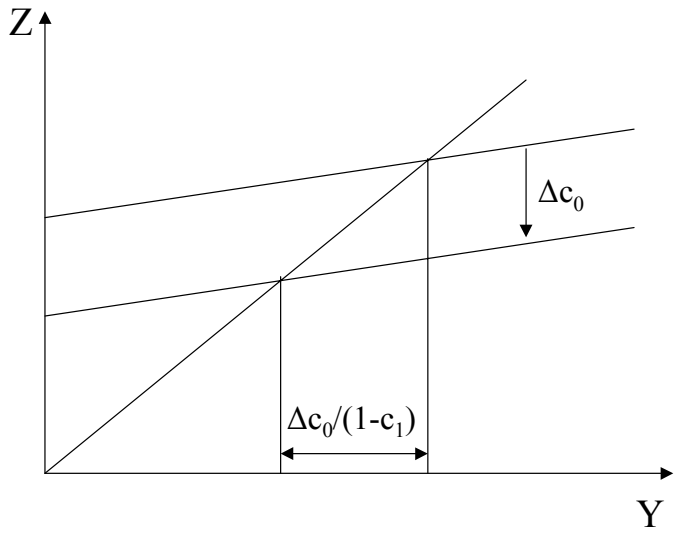
$$Y = \frac{1}{1-c_1}\left[c_0 - c_1 T + \bar{G} + \bar{T} + \bar{I}\right].$$

(g) (4) This decreases the multiplier. To see why, note that setting $t_1 > 0$ is the same as changing the consumption function to $c_0 + c_1(Y - T) = c_0 + c_1(Y - \bar{T} - t_1 Y) = c_0 + c_1(1 - t_1)Y - c_1\bar{T}$. So, when you solve for the multiplier you get $1/\left[1 - c_1\left(1 - t_1\right)\right]$. The amount that equilibrium Y increases with a unit jump in $\bar{G}$ is $1/\left[1 - c_1\left(1 - t_1\right)\right]$. What's happening is that when income increases now T rises a little, cutting into people's planned spending.

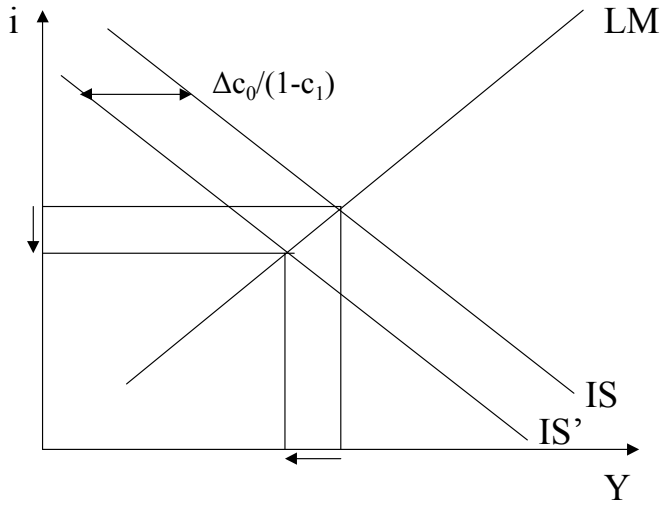
(h) (4) With $q > 0$ the multiplier becomes $1/(1 - c_1 - q)$, which is bigger (potentially, hugely bigger).

2 Question 2

(a) (8) When c_0 falls, the total planned spending curve shifts down and the new equilibrium level of income is lower by $\Delta c_0/(1 - c_1)$. The fall in equilibrium output must be equal to what is necessary to restore the old level of saving because in equilibrium, it must be the case that planned saving equals the government deficit plus investment ($S = (T - G) + I$). In the Keynesian Cross model, these last two things are exogenous. So, if c_0 falls, pushing up planned spending, then Y in the planned spending function must fall enough so that people choose the same level of planned saving after all.



(b) (7) The IS curve shifts left by $\Delta c_0/(1-c_1)$. The drop in equilibrium income will be smaller, however, because the interest rate will drop, stimulating investment. Because Y falls by less than in the KC model, it follows that the negative effect on saving does not fully cancel the positive effect from c_0. So, in this model there is an increase in the quantity saved by households when c_0 drops. The reason is that when c_0 drops, the interest rate effect that this has stimulates a rise in planned spending.

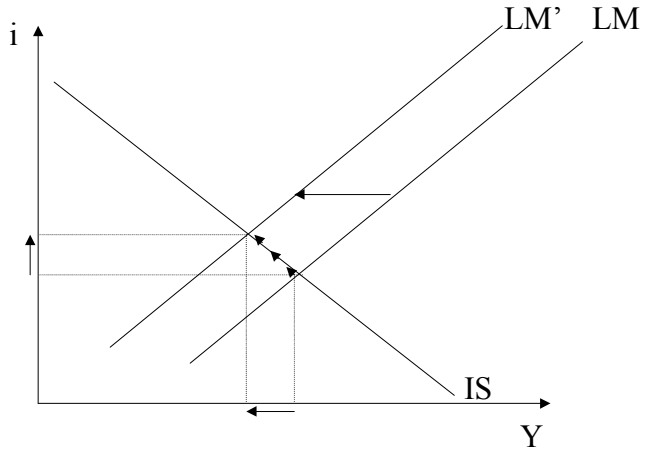


3 Question 3

(a) A rise in $\bar{L}$ increases the quantity of money demanded for EVERY value of i and Y.

(b) If people think that in the near future the stock market will drop, then it makes sense to sell equity right now. This corresponds to a rise in money demand for every given value of i and Y.

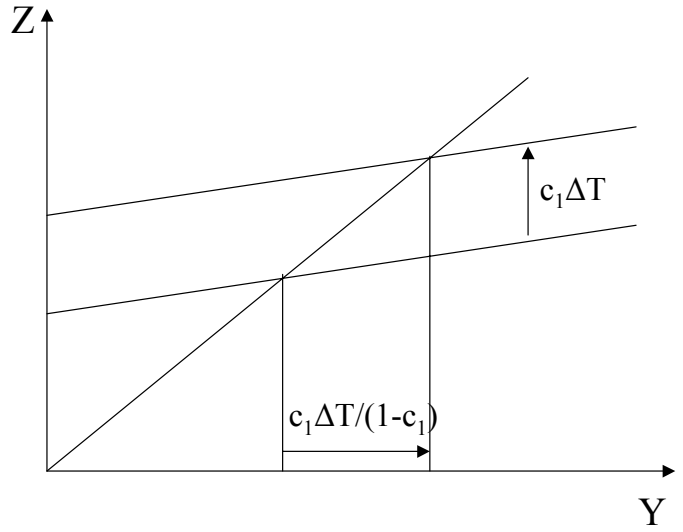
(c) (i) The LM curve shifts to up and to the left, because - for every value of Y, the interest rate has to increase in order to maintain equilibrium in the financial markets in view of an increased money demand and a fixed money supply. The IS curve is not affected. (ii) The new equilibrium involves a higher interest rate (for the same reason as in (i)). Y is lower because investment is negatively affected by the increased interest rate. (iii) In the transition from the 'old' to the 'new' equilibrium, the interest rate jumps up immediately to the 'new' LM curve, because financial markets 'adjust quickly'. At the 'old' output and higher interest rate, there is an excess supply in the goods market due to decreased investment, i.e. Y>Z. As firms decrease production, the economy moves along the 'new' LM curve to the 'new' equilibrium.



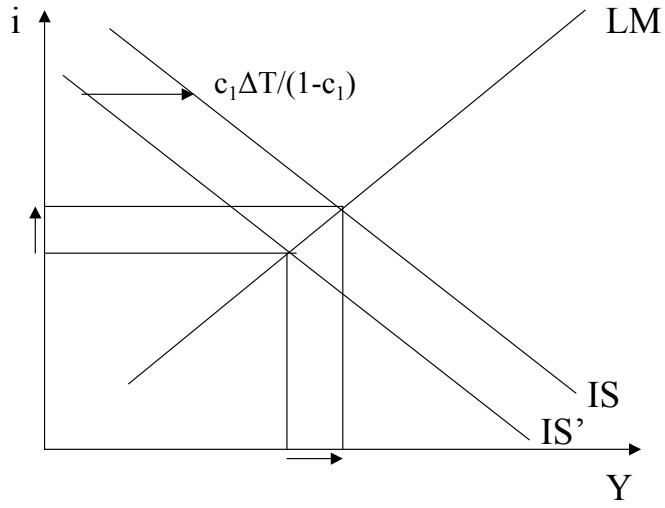
4 Question 4

(a) (10) Equilibrium income increases by $\frac{c_1}{1-c_1}\Delta T$ [where ΔT denotes the change in T]. This is our tax multiplier in the Keynesian cross model. Taxes

fall by ΔT, so disposable income $Y - T$ rises by $[\frac{c_1}{1-c_1}\Delta T + \Delta T] = \frac{c_1}{1-c_1}\Delta T$T. The marginal propensity to save out of an increase in disposable income is $(1 - c_1)$, so that the rise in saving equals ΔT. That is, private saving rises by the same amount as the increased government borrowing, and there is no crowding out.



(b) (10) The cut in taxes shifts the IS curve to the right by $\frac{c_1}{1-c_1}\Delta T$. But, equilibrium output increases by less because the interest rate has to increase to retain equilibrium in the financial markets, reducing investment. Therefore private saving increases by less than in the Keynesian cross model. As a result, there is partial crowding out. Indeed, equilibrium investment falls with the higher rate of interest. For the movement from the 'old' to the 'new' equilibrium, the reasoning involves an initial excess demand $(Z > Y)$ in the goods market after the decrease in taxes, followed by an increase in firms' production and a movement along the LM curve to the 'new' equilibrium.



(c) (10) The accelerator effect constitutes a positive effect of Y on the level of investment. With the accelerator effect the multiplier is a lot bigger, because every increase in Y not only increased consumption but also investment. It can be as big as you want with q sufficiently big. This means the rise in saving can be as big as you want. If the rise in saving is bigger than the original increase in borrowing, then investment actually rises and there is negative crowding out.