Department of Economics
Queen's University

ECON 320: Macroeconomic Theory II
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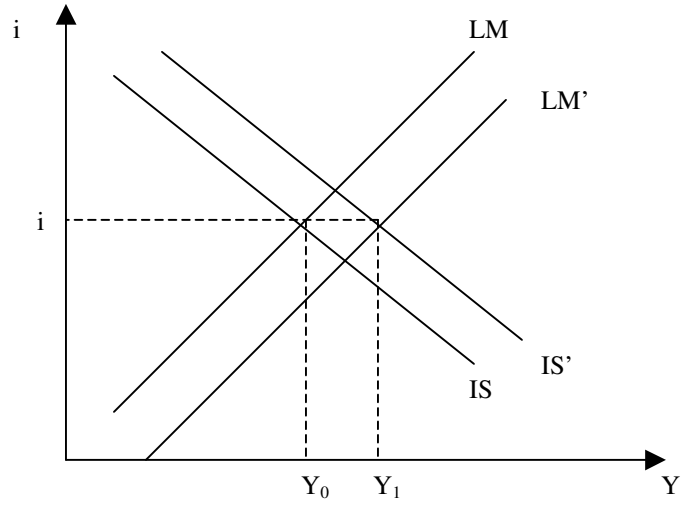
Midterm Examination
4:00 pm, Monday February 28, 2005

Section A(40 percent): Read the following statements and indicate whether they are True, False or uncertain. Briefly explain your answer. NO MARK WILL BE GIVEN FOR UNSUPPORTED ANSWERS. All questions have equal value

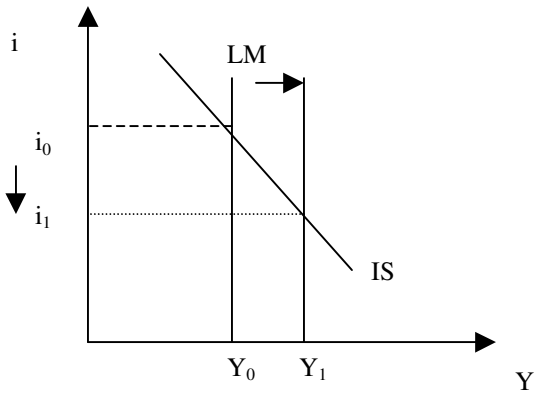
A1. Suppose that instead of fixing the money supply, the bank of Canada targets a fixed nominal interest rate and allows the money supply to adjust endogenously so as to achieve this target. In this context of the basic IS-LM framework, such a policy tends to offset the effects of exogenous fluctuations in government spending on aggregate output.

False- such a policy will amplify the effects of demand fluctuations. An increase in public purchases, cause the IS curve to shift out. In absences of any policy response this would cause output and interest rates to rise. However, if the central bank is trying to maintain a fixed nominal interest rate, it will have to increase the money supply in response to the effective increase in money demand. This will shift the LM curve, so that the effect on aggregate output will indeed be amplified. There is no crowding out



A2. When the real demand of money depends only on income, Keynesians are likely to advocate fiscal rather than monetary expansion in response to a deep recession

False- when the LM curve is vertical, and when the economy is in a really deep recession due to lack of investment and/or consumption demand, then the economy is very responsive to monetary stimulus. Keynesians would, instead, advocate monetary expansion in an attempt to shift the LM curve upward instead of the IS curve, and push the economy out the recession.



A3. Consider a household that lives for two periods and chooses its consumption path optimally. The utility function is : $U(C_1, C_2) = \ln C_1 + \beta \ln C_2$**, and his intertemporal budget constraint is** $C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$**. The Euler equation characterizing the households optimal consumption path is :** $C_1 = \beta(1+r)C_2$

False- using the Lagrangian method we find that:

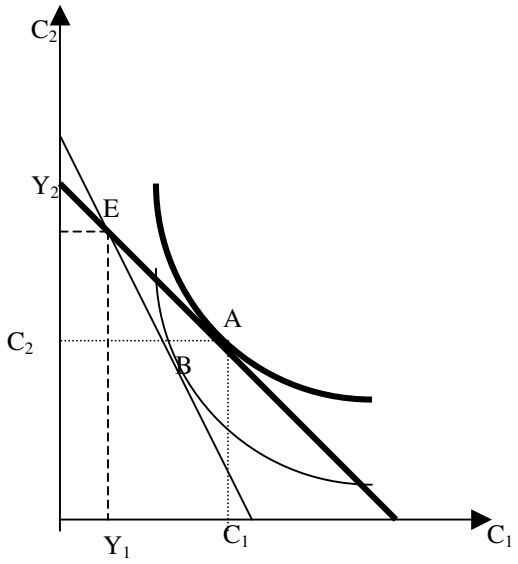
$$\left.\begin{aligned} U'(C_1) &= \lambda \\ \beta U'(C_2) &= \frac{\lambda}{1+r} \end{aligned}\right\} \Rightarrow \frac{U'(C_1)}{\beta U'(C_2)} = (1+r)$$

$$\Rightarrow \frac{1}{C_1} = \beta(1+r)\frac{1}{C_2}$$

$$\Rightarrow C_2 = \beta(1+r)C_1$$

A4. If the consumer in question A3 is a borrower, an increase in the interest rate will cause it to increase consumption in at least one period.

False- the interest rate increase causes the households budget constraint to rotate in a clockwise direction around the endowment point, E. If the household is a borrower, as illustrated bellow, the increase in the interest rate causes it to move from A to B making it worse off. This may result in a decrease in consumption in both periods and certainly in at least one.



B1. (40 percent) Consider an economy described by the production function

$$\mathbf{Y = F(K,L) = K^{1/2} L^{1/2}.}$$

a) Does this production function have constant returns to scale? Explain

A production function has constant returns to scale if increasing all factors of production by an equal percentage causes output to increase by the same percentage. Mathematically, a production function has constant returns to scale if zY = F (zK, zL)for any positive number z

$$F(zK, zL) = (zK)^{1/2} (zL)^{1/2} = z\, K^{1/2} L^{1/2} .= zY$$

Therefore the production function $Y = K^{1/2} L^{1/2}$ has constant returns to scale.

b) What is the per worker production function, y =f(k)?

To find the per-worker production function, divide the production function $y= K^{1/2} L^{1/2}$ by L:

$$\frac{Y}{L} = \frac{K^{1/2} L^{1/2}}{L} = \left(\frac{K}{L}\right)^{1/2}$$

$$y = k^{1/2}$$

c) Assuming no population growth or technological progress, find the steady state capital stock per worker, output per worker, and consumption per worker as functions of the saving rate ad the depreciation rate.

Recall that $\Delta k = sf(k) - \delta k$. The steady state value of capital k* is defined as the value of k at which capital stock is constant, so $\Delta k = 0$. It follows that in the steady-state

$$0 = sf(k) - \delta k$$
$$\Rightarrow \frac{k^*}{f(k^*)} = \frac{s}{\delta}$$
$$\Rightarrow \frac{k^*}{k^{*1/2}} = \frac{s}{\delta}$$
$$\Rightarrow k^* = \left(\frac{s}{\delta}\right)^2 \Rightarrow y^* = \left(\frac{s}{\delta}\right) \Rightarrow c^* = (1-s)\left(\frac{s}{\delta}\right)$$

d) What is the golden rule level of the saving rate s?
The golden rule level of the saving rate is when consumption is maximized. The marginal productivity of capital is equal to the depreciation rate

$$MPK = \delta$$
$$\Rightarrow \frac{1}{2}k^{-1/2} = \delta$$
$$\Rightarrow \frac{1}{2}\left(\frac{s}{\delta}\right)^{-1} = \delta \Rightarrow s = \frac{1}{2}$$

Consumption per worker is maximized at a rate of saving of 0.5; that is where s equal capital's share in output. This is the Golden Rule level of s.

B2. (20 percent) It is an election year, and the economy is in a recession. The opposition candidate campaigns on a platform of passing an investment tax credit, which would be effective next year after she takes office. What impact does this campaign promise have on economic conditions during the current year?
If managers think the opposition candidate might win, they may postpone some investments that they are considering. If they wait, and the opposition candidate is elected, then the investment tax credit reduces the cost of their investment. Hence, the campaign promise to implement an investment tax credit next year causes current investment to fall. This fall in investment reduces current aggregate demand and output: the recession deepens.
Note that this deeper recession makes it more likely that voters vote for the opposition candidate instead of the incumbent, making it more likely that the opposition candidate wins.