Macroeconomic Theory
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Suggested Answers to Spring 2009 Midterm Examination #2

Part I.

Question 1.

a. Add the following equations:

AD = C + I + G + NX
Y = Y – T
Y = AD
Md = M

b. The IS Curve comes from plugging taxes into the disposable income equation and the result into the consumption and net export equations.

C = 1200 + .8*(Y+100-.2*Y) = 1280 +.64*Y
NX = 500 - .05*(Y +100 - .2*Y) +.03*Yrow – 10*r = 495 -.04*Y + .03*Yrow – 10*r

Now plug these two results and investment demand into the AD equation and set = Y

AD = 1280 +.64*Y +495 -.04*Y + .03*Yrow – 10*r +300 – 40*r + .2*Y + G
Y = 2075 + .8*Y –50*r + .03*Yrow + G

Now solve for Y to yield: $Y = \dfrac{2075 - 50*r + .03*Yrow + G}{.2}$

The slope $\Delta r/\Delta Y = -1/250 = -.004$

c. The LM Curve can be found by plugging M for Md in the money demand equation and solving for r.

M/P = .5*Y – 50*r which yields r = (.5/50)*Y – (1/50)*(M/P)

with slope $\Delta r \Delta Y = .5/50 = .01$

d. Determine the reduced form statement for Y by plugging the LM curve into the IS curve and solving for Y.

.2*Y = 2075 –50* [(.01)*Y – (.02)*(M/P)] + .03*Yrow + G
.7*Y = 2075 + (M/P) + .03*Yrow + G
so $Y = \dfrac{2075 + (M/P) + .03*Yrow + G}{.7}$

e. To find out the effect of an increase in Yrow on Y, look at the reduced form.

$\Delta Y/\Delta Yrow = .03/.7 = .0429$ since Yrow increases by 100, $\Delta Y = 4.29$
$\Delta r = .01*4.29 = .0429$ From the LM equation

2a. Divide both sides of the production function by L to yield
$Y/L = Tech*K^{.3}\ L^{-.7}$ which can be rewritten as $y = Tech*k^{.3}$
This becomes the long run supply with y, k and Tech, a function of time.

b. Write down the long run demand curve from Model 1G as

$$y = \frac{(n+\delta)*k}{s}$$

Solve the two equations together to yield $y_\tau = Tech_\tau^{1.43}*(s/(n+\delta))^{.43}$

Thus, the equilibrium path for y depends upon the level of technology in period τ.

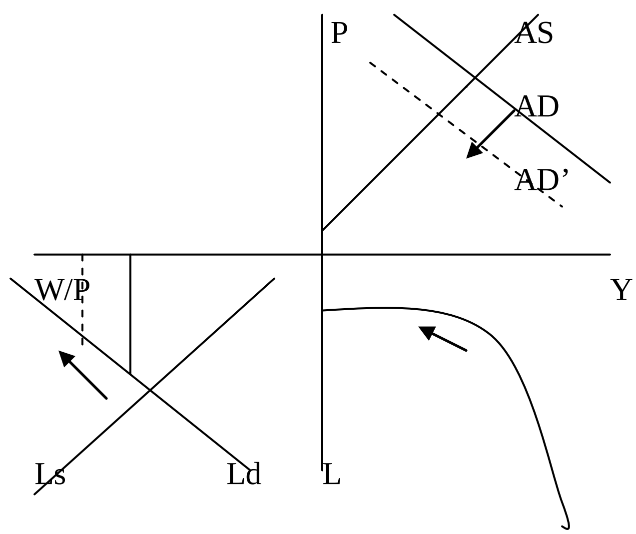
c. Long run growth for y can be determined from either the production function or the equilibrium statement. Since the growth of k = 0 or since n,δ, and s are constants, the growth of y must equal the growth of Tech (*i.e.*, g.)

d. To determine the optimal level of the savings rate, the following equation must be maximized with respect to s.

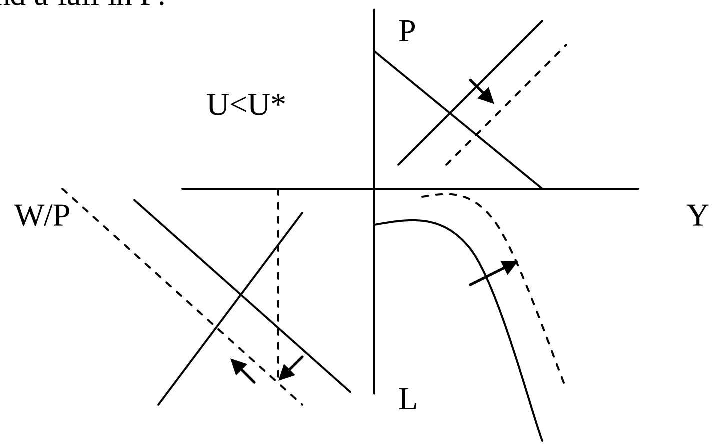
$c_\tau = (1-s)*y_\tau = (1-s)*\ Tech_\tau^{1.43}*(s/(n+\delta))^{.43}$
$\partial c/\partial s = -\ Tech_\tau^{1.43}*(\ s/(n+\delta))^{.43} + \ .43*[(\underline{1-s})/(\ n+\delta)]*\ Tech_\tau^{1.43}*(s/(n+\delta))^{-.57} = 0$
which can be solved to yield s = .43/1.43 = .3 This is capital's share.

e. We can look at part b and see that a rise in n increases the denominator so y would fall. The same result holds for k.

3a A decrease in g would reduce AD which would lead to a fall in prices and output. In the labor market, the real wage would rise (since P increases); as a result quantity of labor demanded would decline.



b. An increase in the level of technology would shift out both the production function and the labor demand curve. Starting in the labor market, we would see that employment increased (at the initial W/P). Tracing the results around the four corners leads to increased output and decreased prices. We need to go back to the labor market and raise W/P since P fell. We then go back to the goods market and shift the AS curve to the right. The end result would be rises in L, W/P, and Y and a fall in P.



4. First, write down version of Model 2 indicated in the problem.

(1) C = a + b*Yd + d*NW
(2) Yd = Y – T
(3) T = to + t1*Y
(4) NX = eX – im0 – im1*Yd
(5) AD = C + I p + G + NX
(6) Y = AD

Determine the reduced form statement for Y by solving the above 6 equations. Plug (3) into (2), and the result into both (1) and (4). Then plug the revised (1) and (4) into (5) and use (6) to generate one equation in Y

Yd = Y – to – t1*Y = Y*(1-t1) – to
C = a + b*[Y*(1-t1) – to] + d*NW and NX = eX – im0 – im1*[Y*(1-t1) – to]
Thus,
Y = a + b*[Y*(1-t1) – to] + d*NW + Ip + G + eX -im0 - im1*[Y*(1-t1) – to]
which can be solved for Y to yield

$$Y = \frac{a - b*to + Ip + G + eX - im0 + im1*to}{1 - b*(1-t1) + im*(1-t1)}$$

as b falls (with an increased propensity to save), the denominator becomes larger so Y falls unless to is very large.

S = Y – C – T which = Y*[1-b*(1-t1) – t1] – a – (1-b)*to + d*NW
as long as t1 and t0 are small enough, S is positively related to Y; a fall in b would generate a fall in S. Since we don't know the magnitude of to or t1, uncertain would be the best answer. For other models, the AD relationship remains the same so the effects would be the same. This also holds whenever the AS curve is flat or upward sloping.

5. Fiscal policy refers to running intentionally a budget deficit. We can represent this by either a change in the level of governmental expenditures or a change in taxes. For this problem, I will assume a change in G.
For Model 2 the multiplier of G on output Y would be given by

$$\Delta Y / \Delta G = 1 / 1-b$$

For Model 3, the multiplier would be

$$\Delta Y / \Delta G = \frac{(1- b)}{1- b*(1-t1) + m + [(d+n)/h]*k}$$

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This multiplier is smaller than the one for Model 2.

For Model 4, a term from the aggregate supply curve would also enter the denominator; thus, the multiplier would be smaller than in Model 3.

There are several ways in which the multiplier would approximate zero. If h approaches zero (or if d + n is extremely large), then the denominator would become extremely large which would make the multiplier very small. A zero value for h would generate a vertical LM curve and suggest money holding that is insensitive to interest rates. Secondly, if the supply curve were vertical, then the supplier curve term that would enter the denominator would be extremely large which would also make the multiplier very small.