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ECO 209Y
MACROECONOMIC THEORY

Solution to Problem Set 9
(Odd numbers only)

1. a) First, we must obtain the expression for the aggregate expenditure function:

$AE = C + I + G + NX$

$= (60 + 0.8\ YD) + (200 – 20\ i + 0.1\ Y) + 300 + (250 + 200\ e) – (400 – 100\ e + 0.1\ Y)$

$= 410 + 300\ e + 0.8\ YD – 20\ i$

where $YD = Y – 0.25\ Y + 50 = 50 + 0.75\ Y$

$= 410 + 300\ e + 0.8\ (50 + 0.75\ Y) – 20\ i$

$= 450 + 300\ e + 0.6\ Y – 20\ i$.

In equilibrium, $Y = AE$:

$Y = 450 + 300\ e + 0.6\ Y – 20\ i \rightarrow 20\ i = 450 + 300\ e – 0.4\ Y$.

And solving for i we obtain the equation for the *IS* curve:

$i = 22.5 + 15\ e – 0.02\ Y$.

b) The *LM* curve is found from the money market equilibrium:

$L = M/P \rightarrow 0.2\ Y – 10\ i = 200 \rightarrow 10\ i = 0.2\ Y – 200$

And solving for i we obtain the equation for the *LM* curve:

$i = 0.02\ Y – 20$.

c) $BP = NX + CF$

$= – 150 + 300\ e – 0.1\ Y + 10\ i – 60$

$= – 210 + 300\ e – 0.1\ Y + 10\ i$

The equation for the *BP* is found by making $BP = 0$:

$– 210 + 300\ e – 0.1\ Y + 10\ i = 0 \rightarrow 10\ i = 210 – 300\ e + 0.1\ Y$

And solving for i we obtain the equation for the BP curve:

$i = 21 – 30\ e + 0.01\ Y$

d) We have a set of three equations (IS, LM, and BP functions) and three unknown (Y, i, and e):

IS: $i = 22.5 + 15\ e – 0.02\ Y$

LM: $i = – 20 + 0.02\ Y$

BP: $i = 21 – 30\ e + 0.01\ Y$

IS = LM $\rightarrow 22.5 + 15\ e – 0.02\ Y = – 20 + 0.02\ Y \rightarrow 0 = 42.5 + 15\ e – 0.04\ Y$ (1)

BP = LM $\rightarrow 21 – 30\ e + 0.01\ Y = – 20 + 0.02\ Y \rightarrow 0 = 41 – 30\ e – 0.01\ Y$ (2)

And solving for (1) and (2):

$2\ (1) + (2) = 0 \rightarrow 85 + 30\ e – 0.08\ Y + 41 - 30\ e – 0.01\ Y = 0 \rightarrow 126 – 0.09\ Y = 0 \rightarrow Y = 1400$

Plugging this value for *Y* in the LM curve we obtain the equilibrium value of *i*:

$i = – 20 + 0.02\ (1400) = 8$

And plugging these values for *Y* and *i* in the BP curve we obtain the equilibrium value of *e*:

$8 = 21 – 30\ e + 0.01\ (1400) \rightarrow 30\ e = 27 \rightarrow e = 0.9$

e) $NX = X - Q = -150 + 300\ (0.9) - 0.1\ (1400) = -150 + 270 - 140 = -20$
$CF = 10\ (8) - 60 = 20$

f) We have a set of two equations (IS and BP functions) and two unknowns (Y and i):

IS: $i = 22.5 + 15\ (1) - 0.02\ Y = 37.5 - 0.02\ Y$

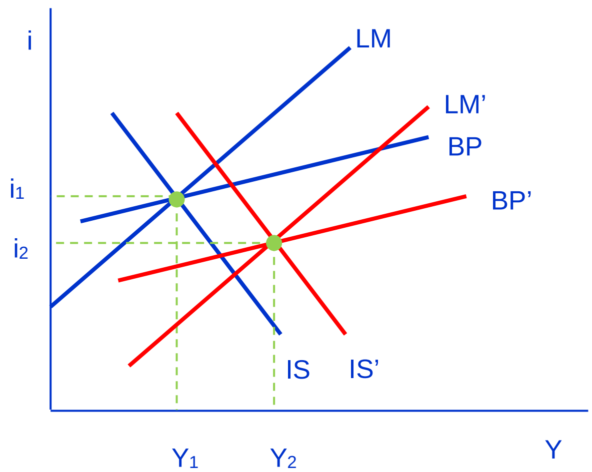
BP: $i = 21 - 30\ (1) + 0.01\ Y = -9 + 0.01\ Y$

IS = BP → $37.5 - 0.02\ Y = -9 + 0.01\ Y$ → $0.03\ Y = 46.5$ → $Y = 1550$

And plugging this value for Y in the IS curve we obtain the equilibrium value of i:

$i = 37.5 - 0.02\ (1550) = 6.5$

Graphical analysis: The increase in the value of the exchange rate increases NX at each level of Y, i.e., graphically the IS curve shifts up to the right and the BP curve shifts down to the right. Since the central bank sets the value of the exchange rate above the market equilibrium value, an excess supply arises in the foreign exchange market. To prevent the exchange rate from depreciating, the central bank purchases foreign currency and the domestic money supply increases — thus the LM curve shifts down to the right until equilibrium in the external sector is re-established. Note that the new equilibrium is thus determined by the intersection of the IS and the BP curves.



g) $NX = X - Q = -150 + 300\ (1) - 0.1\ (1550) = -150 + 300 - 155 = -5$
$CF = 10\ (6.5) - 60 = 5$

3. If the Canadian interest rate is i = 4% and you expect the U.S. dollar to depreciate by 5%, then the yield on U.S government bonds would have to be i* = 9% or more to make the purchase of U.S. government bonds profitable. When capital is perfectly mobile, in equilibrium the domestic interest rate (i) is approximately equal to the foreign interest rate (i*) adjusted for the expected percentage change in the exchange rate (e), that is,

$$i = i^* + (\%\Delta e) \rightarrow i^* = i - (\%\Delta e) = 4\% - (-5\%) = 9\%.$$