6

Real ex rate - price domestic good in foreign currency = $\frac{\text{US good foreign \$}}{\text{foreign good foreign \$}}$

↑ domestic goods more expensive

Nominal E - # of dollars for 1 foreign currency

Appreciation - currency more valuable $E\uparrow$

$\epsilon = \frac{E P}{P^*}$ | ↑ price domestic in terms foreign

real appreciation - rel domestic $P\uparrow$ rel to foreign

GDP deflator to compare prices

GDP - domestic production

GNP - domestic owned production

$CA = S - I$ ← current acct "above the line"

NX - export > import - foreigners owe us - so like saving abroad

Net return on asset - profits US owned factories - profits foreign owned factories

Net transfers - foreign aid

$CA = (X - IM) + rA^* - rA$ - aid

$= \Delta A^* - \Delta A$ ← capital "below the line"

$Z = C + I + G - \frac{IM}{\epsilon} + X$ (IM in foreign currency)

$IM = IM(Y, \epsilon)$ (⊕, ⊕)

$X = X(Y^*, \epsilon)$ (⊕, ⊖)

$DD = C + I + G \equiv C(Y_d) + I(Y, r) + G$

domestic demand

$AA = DD - \frac{IM}{\epsilon}$

↑ domestic demand for domestic goods

$ZZ = AA + X$

↑ demand for domestic goods

$Y = Z$ still

- some demand might be foreign
- could have trade deficit/surplus

14.02 Quiz 2

Marshall-Lerner condition - depreciation leads to $\uparrow NX$

$X\uparrow$ $IM\downarrow$ $\frac{1}{\epsilon}\uparrow$ $\frac{\partial NX}{\partial \epsilon} < 0$

Depreciation: $NX\uparrow$ $Y\uparrow$ $I\uparrow$ $C\uparrow$ output $\uparrow$ either

$S \neq I$ since can also save w/ $\uparrow NX$

$NX = S + (T - G) + I$

Interest rate parity

$1 + i_t = (1 + i_t^*)\frac{E_t}{E^e_{t+1}}$ ← assume constant

$i\uparrow$ $I\downarrow$ usually - but added more IS dependency

$i_t \approx i_t^* \frac{E^e_{t+1} - E_t}{E_t}$

indirect

$\downarrow NX$ also changes Y, so NX change

- $ZZ\uparrow$ $NX\uparrow$

trade balance improves even more

So can $\downarrow$ deficit w/o changing output

- depreciation ↑ output
- Fiscal contraction ↓ output

$\uparrow I$ = worse trade surplus

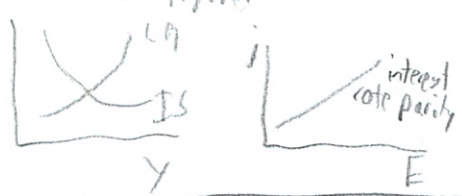
trade surplus = saving > investment

IS has both relations - assume P, P^* constant - no inflation $i = r$

When $i\uparrow$

- $I\downarrow$ like before $\downarrow DD$, $\downarrow$ output
- but also ER (appreciation) $NX\downarrow$, $DD\downarrow$, $Y\downarrow$

Both effects together



Fiscal Policy ↑G

$Y\uparrow$, $i\uparrow$, appreciation ~ domestic bonds more attractive

effect on I still ambiguous

output ↑ meaning more $ to invest

but $i\uparrow$ so less desire to invest

Combine to $\downarrow NX$ - so more deficit

Fixed ex rate 4/14

Gov must change M to hold i constant

fiscal policy more powerful

leads to large unemp ↓/ no way to fix

IS-LM in open econ = Mundell Fleming model

Quantative easing

in liquidity trap, buy long term bonds as well

Usual yield curve

Gov must repay $B(1+r)$ next year

Or just Br to keep level

Ricardo equivalence - with some planning horizon households indifferent

- Since save now (earn interest) and plan for gov to pay tomorrow

but if gov planning horizon is longer, or people can't borrow (liquidity constrained)

$C = C(Y_{disp}, Wealth)$

$Wealth = W_{fin} + W_{housing} + PDV(Y_{future\ income})$

w/ fixed - if people expect $E\downarrow$, people demand ↑ i - even more incentive to depreciate

14.02 Principles of Macroeconomics

Quiz # 2

April 15th 2010

1 Short Questions [30 points]

Please mark the right answer. Each of these is worth 6 points.

1. The present pattern of current account positions in the world economy consists of:
   (a) A low savings rate in the U.S. and other rich countries, and large capital inflows into these economies.
   (b) A low savings rate in China and other emerging countries, and large capital inflows into these economies.
   (c) A high savings rate in the U.S. and other rich countries, and large capital inflows into these economies.
   (d) A low savings rate in China and other emerging countries, and large capital inflows into these economies.

2. Suppose that the 1-period nominal interest rate i_t is 10%. At date t the Net Present Value of a bond that pays \$110 at date $t+1$ is
   (a) \$110.
   (b) \$100.
   (c) \$121.
   (d) None of the above.

$$= \frac{110}{(1+r)} = \frac{110}{(1+.10)}$$

3. Consider the following situation. The 1-month interest rate in Brazil is 11.1%. The 1-month interest rate in the U.S. is 1%. The exchange rate between the real and the dollar is 10 reals per dollar. What do the interest rates imply for the expected real/dollar exchange rate in one month?
   (a) 10 reals per dollar.
   (b) 11 reals per dollar.
   (c) 9 reals per dollar.
   (d) 15 reals per dollar.

$$(1+.01) = (1+.11)\frac{10}{E^e}$$

$$E^e(1+.01) = 11.11$$

$$E^e = \frac{11.11}{1.01} \approx 11 \text{ reals}$$

$i \uparrow$ $E = (+)$

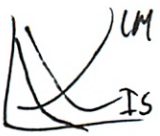
4. Consider an economy where the nominal interest is zero and expected inflation is exogenously given at a strictly positive value. In this economy, $i = 0$

   (a) the real interest rate is zero, and a fiscal contraction has no effect on the economy,

   (b) the real interest rate is strictly positive, and a fiscal contraction has a negative effect on output.

   (c) the real interest rate is strictly negative, and a fiscal contraction has a bigger negative effect on output than in an economy where the real interest rate is strictly positive. real depreciation, NX↑ so less effect

   (d) the real interest rate is strictly negative, and a fiscal contraction has a smaller negative effect on output than in an economy where the real interest rate is strictly positive.



Oh is $r < 0$? thought can't happen - well real rate - so like having deflation

But how does fiscal contraction impact this?

real = negitive

$\varepsilon = \frac{EP}{P^*}$

In the Open Economy Goods' Market model, an increase in government expenditures

(a) shifts the NX (net exports) and ZZ (demand for domestic goods) curves upwards, and the effect on net exports is ambiguous,

(b) shifts the NX curve downward, the ZZ curve upward, and the effect on net exports is ambiguous,

(c) shifts the ZZ curve upward and decreases net exports,

(d) shifts the ZZ and NX curves upward.

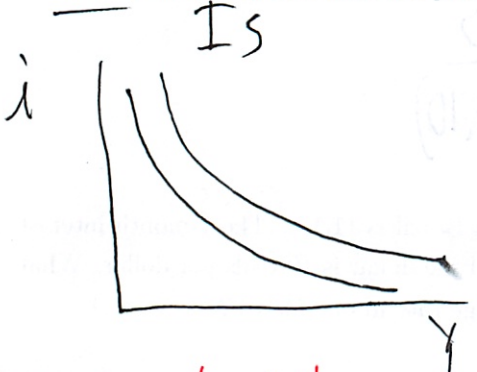
I don't think ambigious

opposet; no; ZZ↑ NX↓ appreciation - foreign stuff more exp

NX; how changed;

2 Open Economy Goods Markets [30 points]

1. Consider a country with a flexible exchange rate where output has fallen from Y_1 to Y_0, and net exports are equal to zero. Show graphically in the Open Economy Goods Markets without Financial Markets which combination of policies is capable of bringing output back to Y_1, keeping net exports equal to zero. Clarify why you need two policy instruments. [6 points]



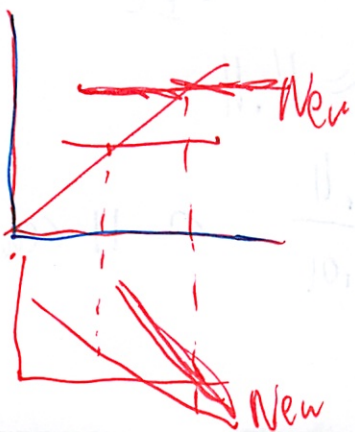
↑ want $S = I$ need same interest

↑ closed econ - no but $S = I$ - So like a closed econ;

So expand fiscal.

Need cont. monetary - shift inward

Currency depreciation ↑ G



What will currency depreciation change? ~NX

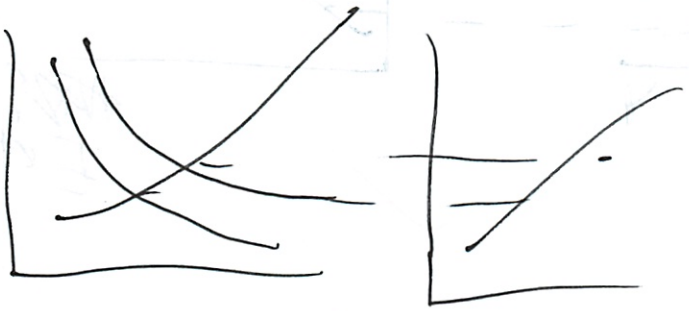
3. Consider now an Open Economy with a fixed exchange rate.

(a) An increase in consumer confidence under a fixed exchange rate. [6 points]

↓ never talked about, but ↑C

- think about all the levers:

(? ↑i since ↑ demand for money

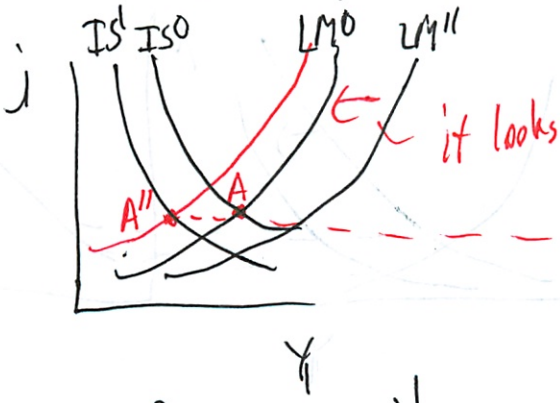


Same as G↑ ✓

(b) A recession in the rest of the world under a fixed exchange rate. [6 points]

Must match other countries i's

So ~~expansionary~~ contractionary MP to make i↑ ← but why a contraction?



← it looks like this direction

↑ not same i!

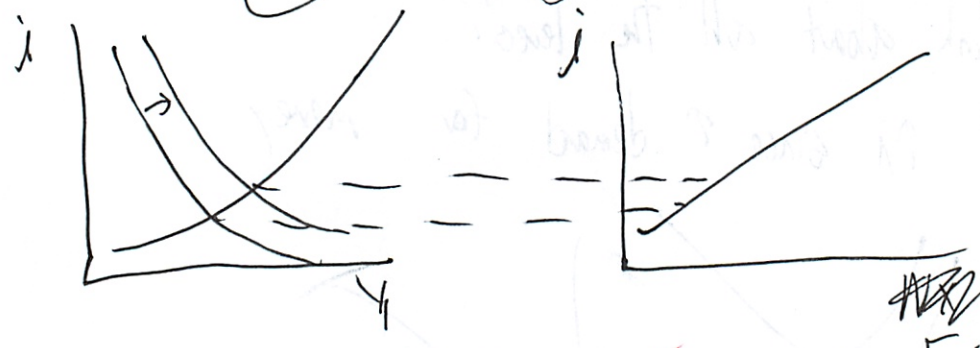
→ fiscal policy becomes more powerful

- So I think I was right

(I actually got this section - did not think I would)

2. Using the Open Economy Goods' Market Model with Financial Markets (Mundell-Fleming), show, using the IS-LM diagram and the Interest Parity Relation diagram, show the effects on the economy of the following shocks.

(a) An expansionary monetary policy under a flexible exchange rate. [6 points]



think about formula

(b) An expansionary fiscal policy under a flexible exchange rate. [6 points]

No change?

besides LM to right which E not

3 International Policy Coordination [40 points]

The world is composed of two countries whose economies are well described by the following model. Country 1:

$$C = c_0 + c_1 Y$$
$$T = 0$$
$$I = 0$$
$$IM = m\varepsilon Y$$
$$X = \frac{m}{\varepsilon} Y^*$$

Country 2:

$$C^* = c_0 + c_1^* Y^*$$
$$T^* = 0$$
$$I^* = 0$$
$$IM^* = \frac{m}{\varepsilon} Y^*$$
$$X^* = m\varepsilon Y$$

where c_1, c_1^*, m are strictly smaller that 1, G, G^* strictly positive, and $T = T^* = 0$. Assume that $\varepsilon = 1$. Notice that autonomous consumption c_0 is the same in both countries.

1. Solve the model, i.e. express both Y and Y^* as a function of the parameters of the model, G and G^*. [10 points]

$Y = C + I + G + NX$

$= c_0 + c_1 Y + 0 + G + \frac{m\varepsilon Y}{\varepsilon} + \frac{m}{\varepsilon} Y^*$

$Y - c_1 Y + mY = c_0 + G + \frac{m}{\varepsilon} Y^*$

$Y = \frac{c_0 + G + \frac{m}{\varepsilon} Y^*}{1 - c_1 + m}$ ← sub in for further — should not have left it like this

$Y^* = \frac{c_0 + G^* + m\varepsilon Y}{1 - c_1^* + \frac{m}{\varepsilon^2}}$

could do anything else?

2. Suppose they decide that the government of each country will spend the right amount in order bring output back where it was before the crisis, i.e. reach $Y = Y^* = Y_1$. By how much do governments have to increase expenditures? Denote the changes in spending as ΔG and ΔG^*. Express them as a function of Δc_0. Assume that the government of each country sticks to their promise. [10 points]

$Y = Y^* = Y_1$

$$\frac{c_0 + b + mY^*}{1 - c_1 + m} = \frac{c_0 + b^* + mY}{1 - c_1^* + m} = Y_1$$

; how does this help

Where to go from here?

~~Intuitive Bigger b/c not all demand stimulants goes to imports~~

- but where are they now?

Oh I left out a section

C_0 drops in both countries by Δc_0

Gov needs to ↑G by same amt c_0 drops

$Z = C + I + G + X - IM$

Would have been much clearer

Try this Y sub in also $\varepsilon = 1$

$$Y = \frac{C_0 + G + \frac{m}{\cancel{m}}\left(\frac{C_0 + G^* + mY}{1 - C_1 + m}\right)}{1 - C_1 + m}$$

↙ need to get rid of

pull out

$$Y = \frac{C_0 + G + m\left(\frac{C_0 + G^* + \cancel{mY}}{1 - C_1^* + m}\right) + \frac{mmY}{1 - C_1^* + m}}{1 - C_1 + m}$$

$$Y - \frac{mmY}{1 + C_1 + m}$$

$$Y\left(1 - \frac{mmY}{1 - C_1^* + m}\right) = \frac{C_0 + G + m\left(\frac{C_0 + G^*}{1 - C_1^* + m}\right)}{1 - C_1 + m}$$

$$1 - \frac{m^2 Y}{1 - C_1^* + m}$$

$\frac{1}{2} = \frac{1}{2} \cdot \frac{2}{1}$ ← did I do this right? (no) $\frac{1}{4}$

$$= \frac{C_0 + G + m\left(\frac{C_0 + G^*}{1 - C_1^* + m}\right)}{(1 - C_1 + m)} \cdot \left(1 - \frac{m^2 Y}{1 - C_1^* + m}\right)$$

multiply den

I think I kinda get it

3. Suppose, only for the purpose of this subquestion, that country 2 cannot increase government spending G^*. Thus, $\Delta G^* = 0$. However, given the economic emergency, they are able to convince the government of country 1 to further increase G by $\widetilde{\Delta G}$. Thus, the total change in government spending in country 1 will be equal to ΔG plus $\widetilde{\Delta G}$, where ΔG is the value that you computed in the previous subquestion. In theory, this should benefit country 2 through trade linkages. How large does $\widetilde{\Delta G}$ need to be in order for output in country 2, Y^*, rise back to the initial level Y_1? Is this amount smaller or bigger than ΔG^*, the amount spent by country 2, in the previous question? Provide both an intuitive and a mathematical argument. [10 points]

But what was intial level?
- again missed

Bigger - since not all demand stimulus goes to imports

The drop in atput is

$$\Delta Y^* = \frac{\Delta C_0 + \frac{m}{1-c_1 m}\Delta C_0}{1 - c_1 + m - \frac{m^2}{1-c_1+m}}$$

So essentially instead of $C_0 \to \Delta C_0$

Equate the Θ of this effect of this to effect of G

$$\frac{-\Delta C_0 + \frac{m}{1-c_1+m}\Delta C_0}{1 - c_1^* + m - \frac{m2}{1-c_1+m}} = \frac{\Delta G^* \frac{m}{1-c_1+m}}{1 - c_1^* + m - \frac{m^2}{1-c_1+m}}$$

Solve for

$$\Delta G^* = -\left[1 + \frac{1-c_1+m}{m}\right]\Delta C_0$$

Where is this
- oh just pure G^* effect

Thus $\widetilde{G}^* = -\frac{1-c_1+m}{m}\Delta C_0 > -\Delta C_0$

4. Suppose now that consumption in country 1 is such that $c_1 > c_1^*$. Both countries want to reach their original levels of output, Y_1 and Y_1^*. Notice that now Y_1 and Y_1^* are different. Does one country end up spending more than the other, or do both countries spend the same amount? Provide an intuitive and a mathematical argument. [10 points]

Again $\Delta G = \Delta G^* = -\Delta C_0$

- so spend same amt

Gov needs to $\uparrow G$ by same amt. that C_0 drops C_1 bigger in 1 so initial drop bigger - so stimulus is also more effective

? just stop + think what asking!

14.02 Principles of Macroeconomics

Quiz # 2

April 15th 2010

1 Short Questions [30 points]

Please mark the right answer. Each of these is worth 6 points.

1. The present pattern of current account positions in the world economy consists of:

   (a) A low savings rate in the U.S. and other rich countries, and large capital inflows into these economies.

   (b) A low savings rate in China and other emerging countries, and large capital inflows into these economies.

   (c) A high savings rate in the U.S. and other rich countries, and large capital inflows into these economies.

   (d) A low savings rate in China and other emerging countries, and large capital inflows into these economies.

   Answer: (a)

2. Suppose that the 1-period nominal interest rate i_t is 10%. At date t the Net Present Value of a bond that pays \$110 at date $t+1$ is

   (a) \$110.

   (b) \$100.

   (c) \$121.

   (d) None of the above.

   Answer: (b)

3. Consider the following situation. The 1-month interest rate in Brazil is 11.1%. The 1-month interest rate in the U.S. is 1%. The exchange rate between the real and the dollar is 10 reals per dollar. What do the interest rates imply for the expected real/dollar exchange rate in one month?

   (a) 10 reals per dollar.

   (b) 11 reals per dollar.

   (c) 9 reals per dollar.

   (d) 15 reals per dollar.

   Answer: (b)

4. Consider an economy where the nominal interest is zero and expected inflation is exogenously given at a strictly positive value. In this economy,

   (a) the real interest rate is zero, and a fiscal contraction has no effect on the economy,

   (b) the real interest rate is strictly positive, and a fiscal contraction has a negative effect on output.

   (c) the real interest rate is strictly negative, and a fiscal contraction has a bigger negative effect on output than in an economy where the real interest rate is strictly positive.

   (d) the real interest rate is strictly negative, and a fiscal contraction has a smaller negative effect on output than in an economy where the real interest rate is strictly positive.

   Answer: (c)

5. In the Open Economy Goods' Market model, an increase in government expenditures

   (a) shifts the NX (net exports) and ZZ (demand for domestic goods) curves upwards, and the effect on net exports is ambiguous,

   (b) shifts the NX curve downward, the ZZ curve upward, and the effect on net exports is ambiguous,

   (c) shifts the ZZ curve upward and decreases net exports,

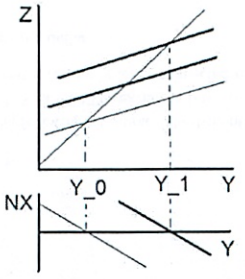
   (d) shifts the ZZ and NX curves upward.

   Answer: (c)

2 Open Economy Goods Markets [30 points]

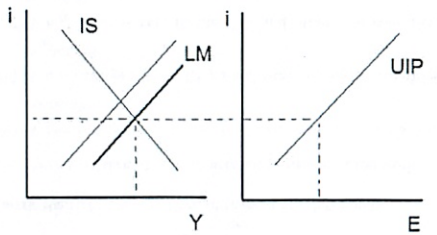
1. Consider a country with a flexible exchange rate where output has fallen from Y_1 to Y_0, and net exports are equal to zero. Show graphically in the Open Economy Goods Markets without Financial Markets which combination of policies is capable of bringing output back to Y_1, keeping net exports equal to zero. Clarify why you need two policy instruments. [6 points]

   Answer: This is what I taught about Poland in recitation. Engineer a currency depreciation and increase G s.t. both targets are achieved. Need two instruments to reach both targets.

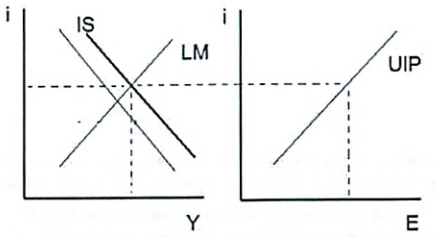


2. Using the Open Economy Goods' Market Model with Financial Markets (Mundell-Fleming), show, using the IS-LM diagram and the Interest Parity Relation diagram, show the effects on the economy of the following shocks.

   (a) An expansionary monetary policy under a flexible exchange rate. [6 points]
   Answer: LM shifts to the right

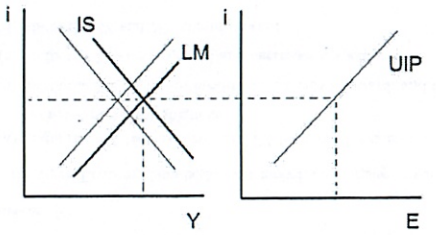


   (b) An expansionary fiscal policy under a flexible exchange rate. [6 points]
   Answer:

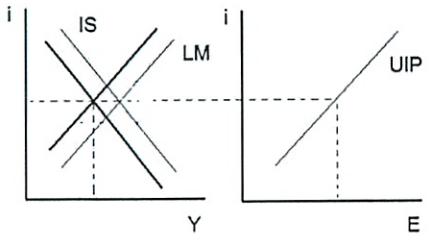


3. Consider now an Open Economy with a fixed exchange rate.

   (a) An increase in consumer confidence under a fixed exchange rate. [6 points]
   Answer:



   (b) A recession in the rest of the world under a fixed exchange rate. [6 points]
   Answer:



3 International Policy Coordination [40 points]

The world is composed of two countries whose economies are well described by the following model. Country 1:

$$C = c_0 + c_1 Y$$

$$T = 0$$

$$I = 0$$

$$IM = m\varepsilon Y$$

$$X = \frac{m}{\varepsilon} Y^*$$

Country 2:

$$C^* = c_0 + c_1^* Y^*$$

$$T^* = 0$$

$$I^* = 0$$

$$IM^* = \frac{m}{\varepsilon} Y^*$$

$$X^* = m\varepsilon Y$$

where c_1, c_1^*, m are strictly smaller that 1, G, G^* strictly positive, and $T = T^* = 0$. Assume that $\varepsilon = 1$. Notice that autonomous consumption c_0 is the same in both countries.

1. Solve the model, i.e. express both Y and Y^* as a function of the parameters of the model, G and G^*. [10 points]

Answer:

$$Y = \frac{c_0 + G + m\left(\frac{c_0 + G^*}{1 - c_1^* + m}\right)}{1 - c_1 + m - \frac{m^2}{1 - c_1^* + m}} \tag{1}$$

$$Y^* = \frac{c_0 + G^* + m\left(\frac{c_0 + G}{1 - c_1 + m}\right)}{1 - c_1^* + m - \frac{m^2}{1 - c_1 + m}}$$

(all the details are in PSet 5, last question).

Suppose that both countries are identical: $c_1 = c_1^*$ and $G = G^*$. Following a global financial crisis, consumers get depressed and the value of c_0 drops by an amount Δc_0. As a consequence, output in each country declines from Y_1 to Y_0. Policy makers from both countries organize a summit to discuss how to fight the economic hardship.

2. Suppose they decide that the government of each country will spend the right amount in order bring output back where it was before the crisis, i.e. reach $Y = Y^* = Y_1$. By how much do governments have to increase expenditures? Denote the changes in spending as ΔG and ΔG^*. Express them as a function of Δc_0. Assume that the government of each country sticks to their promise. [10 points]

   Answer: The government needs to increase G by the same amount that autonomous consumption drops:

$$\Delta G = \Delta G^* = -\Delta c_0$$

   This can be seen either from the way C and G enter the aggregate demand:

$$Z = C + I + G + X - IM$$

   or by looking at (1).

3. Suppose, only for the purpose of this subquestion, that country 2 cannot increase government spending G^*. Thus, $\Delta G^* = 0$. However, given the economic emergency, they are able to convince the government of country 1 to further increase G by $\widetilde{\Delta G}$. Thus, the total change in government spending in country 1 will be equal to ΔG plus $\widetilde{\Delta G}$, where ΔG is the value that you computed in the previous subquestion. In theory, this should benefit country 2 through trade linkages. How large does $\widetilde{\Delta G}$ need to be in order for output in country 2, Y^*, rise back to the initial level Y_1? Is this amount smaller or bigger than ΔG^*, the amount spent by country 2, in the previous question? Provide both an intuitive and a mathematical argument. [10 points]

   Answer: Intuitive: Bigger, because not all of the demand stimulus in the other country goes to imports.

   Mathematical: The drop in output is

$$\Delta Y^* = \frac{\Delta c_0 + \frac{m}{1 - c_1 + m}\Delta c_0}{1 - c_1^* + m - \frac{m^2}{1 - c_1 + m}}$$

Equate the negative of this to the effect of ΔG^*:

$$-\frac{\Delta c_0 + \frac{m}{1-c_1+m}\Delta c_0}{1-c_1^*+m-\frac{m^2}{1-c_1+m}} = \frac{\Delta G^* \frac{m}{1-c_1+m}}{1-c_1^*+m-\frac{m^2}{1-c_1+m}}$$

Solve for ΔG^*:

$$\Delta G^* = -\left[1+\frac{1-c_1+m}{m}\right]\Delta c_0$$

Thus, $\widetilde{\Delta G^*} = -\frac{1-c_1+m}{m}\Delta c_0 > -\Delta c_0$.

4. Suppose now that consumption in country 1 is such that $c_1 > c_1^*$. Both countries want to reach their original levels of output, Y_1 and Y_1^*. Notice that now Y_1 and Y_1^* are different. Does one country end up spending more than the other, or do both countries spend the same amount? Provide an intuitive and a mathematical argument. [10 points]

   Answer: Again,

$$\Delta G = \Delta G^* = -\Delta c_0$$

   so in fact both countries end up spending the same amount.

   Intuition: The government needs to increase G by the same amount that autonomous consumption drops. The multiplier in country 1 is bigger than in country 2, so the initial drop in consumption is also bigger, but the stimulus is also more effective.

14.02 Principles of Macroeconomics
Spring 2009

Quiz 3 Solutions

1 Multiple Choice Questions (30 points)

1. If the Fisher hypothesis is true, monetary policy with respect to output:

   a. does not have an effect in the short run, but has an effect in the medium run.

   b. has an effect in the short run, but hoes not have an effect in the medium run.

   c. has an effect in both the short and medium run.

2. In an IS-LM model, a decrease in the expected future real interest rate

   a. does not affect either curve.

   b. shifts both IS and LM curves upward.

   c. shifts IS curve upward, does not affect LM curve.

3. Higher expected inflation in the US will lead to

   a. a depreciation of the US dollar vis-a-vis foreign currencies.

   b. an appreciation of the US dollar vis-a-vis foreign currencies.

   c. does not affect the exchange rates of the US dollar.

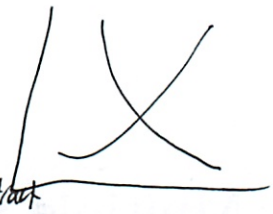
4. Consider an open economy with flexible exchange rates and in which the Marshall-Lerner condition holds. Suppose output is at the natural level, but there is a trade surplus. The appropriate fiscal-monetary policy mix (to achieve trade balance and natural output) is

I > S

a. a fiscal expansion and a monetary contraction.

b. a fiscal contraction and a monetary contraction.

c. a fiscal expansion and a monetary expansion.



Expand output ← fiscal ex. ↓ NX ← want to ↑ i so contract

5. The US is running a current account deficit against the rest of the world (ROW), therefore

a. ROW holding of US assets is increasing less than the US holding of ROW assets.

b. ROW holding of US assets is increasing more than the US holding of ROW assets.

c. both can happen.

Read Ting closly!

Read too fast

2 Stock Market and Monetary Policy (35 points)

Consider the following dynamic economy: For each $t \geq 0$.

time indices!

$$\begin{aligned} Y_{t+1} &= C_{t+1} + I_{t+1} \\ C_{t+1} &= cY_{t+1} \\ I_{t+1} &= a - bi_t \\ \frac{M_t^d}{P_{t+1}} &= Y_{t+1} - di_t \\ M_t^d &= M_t^s \end{aligned}$$

Suppose price level remains at $P = 1$ in every period. The parameters $a, b, c, d, M > 0$ satisfy

$$\begin{aligned} 0 &< c < 1 \\ a &> (1-c)M \end{aligned}$$

0. Preliminary (3 points) Suppose $M_t^s = M$ in every period, solve for the equilibirum level of output and interest rate in each period.

So this is IS LM

$Y_{t+1} = C + I$

$= c Y_{t+1} + a - b i_t$ ✓

$Y(1-c) = a - b i_t$ ✓

$Y_{t+1} = \frac{a - b i_t}{1-c}$ ✓

$M_t^d = M_t^s$

$\frac{M_t^s}{P_{t+1}} = Y_{t+1} - d i_t$ ✓

forgot how to combine - not on cheat sheet

$\frac{M}{P_{t+1}} = \frac{a - b i_t}{1-c} - d i_t$

Solve for Y, i

- not suppose to ref each other

1. (4 points) Assume the stock market expects that $M_t = M$ for all $t \geq 0$, calculate the nominal value of the stock market at time $t = 0$.

I did not do

2. (9 points) Suppose that at time $t = 1$, the Fed decides to expand the money supply over one period by ΔM (assume ΔM is much smaller than M). What is the value of stock market at time 1? Show that the value of stock market increases from $t = 0$ to $t = 1$.

What next, sole for I_t

$$\frac{a}{1-c} + I_t\left(\frac{-b}{1-c} - d\right) = M$$

$$I_t = \frac{M - \frac{a}{1-c}}{\frac{-b}{1-c} - d} = \frac{a - (1-c)M}{d(1-c)+b}$$

Plug in to Y

$$Y_{t+1} = a - b\left(\frac{M - \frac{a}{1-c}}{\frac{-b}{1-c} - d}\right)$$

$$1 - c$$

; simply further

get rid of double division — each piece

$$\frac{\frac{a}{1-c} - bM - \frac{ba}{1-c}}{\left(\frac{-b}{1-c} - d\right)(1-c)} = \frac{ad + bM}{d(1-c)+b}$$

So only 2 simplifying issues

3. (9 points) Suppose that the one time increase in money supply is expected by the financial market at time $t = 0$. What is the new value of the stock market at time $t = 0$? How does that value compare with the old value of the stock market in the Question 1? How does that value compare with the new value of the stock market in Question 2?

Skip

4. points) Suppose that the Fed decides to keep the output constant by adjusting the supply of money (ΔM). What is the new level of money supply? What is the value of the stock market at time 1? How does that value compare with the value of the stock market at time 0?

Skip

5. (9 points) Suppose that the Fed decides to keep the interest rate constant. What is the new level of money supply (ΔM)? What is the value of the stock market at time 1? How does that value compare with the value of the stock market at time 0?

Skip

3 Open Economy (35 points)

Consider a world economy with only two countries. The home country is characterized by:

$$\begin{aligned} C &= c_0 + c_1 Y \\ I &= c_2 Y \\ \frac{IM}{e} &= mY \\ X &= \frac{x\tilde{Y}}{e} \end{aligned}$$

where $C, Y, \tilde{Y}, I, IM, X, e$ denote aggregate consumption, domestic output, foreign output, investment, imports, exports and the real exchange rate, respectively. Assume $c_0 > 0, 0 \leq c_1 \leq 1, c_2 > 0, 0 \leq m \leq 1$, $1 + m > c_1 + c_2, 0 \leq x \leq 1$.

The foreign country is characterized by

$$\begin{aligned} \tilde{C} &= \tilde{c}_0 + \tilde{c}_1 \tilde{Y} \\ \tilde{I} &= \tilde{c}_2 \tilde{Y} \\ \frac{\widetilde{IM}}{\tilde{e}} &= \tilde{m}\tilde{Y} \\ \tilde{X} &= \frac{\tilde{x}Y}{\tilde{e}} \end{aligned}$$

Assume that parameters in the foreign economy satisfy assumptions analog to the ones for the domestic economy.

We will assume throughout the question that the real exchange rate (e) is exogenously given.

Denote by G the amount of Government spending in the home country and by $\tilde{G}$ the amount of Government spending in the foreign country.

1. (6 points) Find the equilibrium level of output in the domestic goods market as a function of $e, G, \tilde{Y}$ and parameters. Find the multiplier (denote it by M). Find equilibrium in foreign goods market as a function of $\tilde{e}, \tilde{G}, Y$ and parameters. Find the multiplier in the foreign country (denote it by $\tilde{M}$).

Same as other test

$$Y = C + I + G - \frac{IM}{e} + X$$

$$= c_0 + c_1 Y + c_2 Y - mY + \frac{X Y^*}{e}$$

i don't have to solve 1 in the other - good!

$$Y(1-c_1-c_2+m) = C_0 + \frac{X\hat{Y}}{\epsilon}$$

$$Y = \frac{C_0 + \frac{X\hat{Y}}{\epsilon}}{1-c_1-c_2-m} \qquad M = \frac{1}{1-c_1-c_2-m} \qquad Y = M\left(C_0 + \frac{X\hat{Y}}{\epsilon}\right) + G$$

Same for foreign

$$\tilde{Y} = \frac{\tilde{C}_0 + \frac{\tilde{X}Y}{\tilde{\epsilon}}}{1-\tilde{c}_1-\tilde{c}_2-\tilde{m}} \qquad \tilde{M} = \frac{1}{1-\tilde{c}_1-\tilde{c}_2-\tilde{m}} \qquad \tilde{Y} = \tilde{M}\left(\tilde{C}_0 + \frac{\tilde{X}Y}{\tilde{\epsilon}}\right) + \tilde{G}$$

forgot G! - darn

2. (3 points) Does the Marshall Lerner condition hold under our assumptions? Show why or why not.

Yes (we assume it always holds)

So if E↑, then NX↓ (IM↑, X↓)

", what else to say? - missing something?

Yes since $NX = \frac{X\hat{Y}}{e} - mY$

Net exports are ↓ in the real ex rate

↙ How is that more than what I wrote?

3. (3 points) State a condition relating e and ẽ.

$$\epsilon = \frac{1}{\tilde{\epsilon}}$$ ✓

4. (6 points) Solve for domestic output as a function of just ϵ, G, $\tilde{G}$ and parameters $(c_0, \tilde{c}_0, x, \tilde{x}, M, \tilde{M})$. Assume $Mx\tilde{M}\tilde{x} < 1$.

Here they want you to solve for $\epsilon = \frac{1}{\tilde{\epsilon}}$

$$Y = M\left(c_0 + x\left(\widehat{m} + \frac{\widehat{x}\,y}{\epsilon} + \widehat{G}\right) + G\right)$$

$$= M\left(c_0 + \widehat{\epsilon} \times \left[\widehat{m} + \widehat{x}\,y\epsilon + \widehat{G}\right) + G\right)$$

$$= M\left(c_0 + x\left[\left(\widehat{m} + \widehat{x}\,y\epsilon + \widehat{G}\right)\right] + G\right)$$

$$\frac{M}{1 - Mx\tilde{M}\tilde{x}}\left[c_0 + \tilde{M}\frac{c_0}{\epsilon} + x\tilde{M}\frac{\widehat{G}}{\epsilon} + G\right]$$

just simp prob.

5. (6 points) Suppose that the home country has decided to devote 100 units of the local good to boost the economy (increase home output). The Secreaty of the Treasury has proposed to use the resources to increase public spending ($\Delta G = 100$). Can the home country be better off by giving away the 100 units of the local good to the Foreign government on the condition that the goods are fully used for Foreign public spending ($\Delta\tilde{G}$)? If so, state a precise mathematical condition that guarantees your answer. If not, show why.

No - previous exam had - since not all foreign goods comes back - only via multiplier

But what was math: - oh

Only $x\Delta G$ comes back ← this is in wrong currency

$\frac{x\Delta G}{\epsilon}$ ← so remove this only $x\Delta G$

and $x < 1$

Yes

$\Delta\tilde{G} = 100\,\epsilon$

effect on Home output > 100 if provided $x\tilde{M} > 1$

↑ how know that?

6. (5 points) Write a condition relating IM and $\tilde{X}$ and a condition relating $\widetilde{IM}$ and X. Show that each condition imposes a restriction on the parameters.

So $IM = \widehat{X}$ roughly

$$\frac{IM}{\varepsilon} = \widehat{X} = \frac{\widehat{X}\,Y}{\varepsilon} = m\,Y$$

one more step

$$m = \widehat{X}$$

$$X = \frac{\widehat{IM}}{\varepsilon} = \widehat{m}\,\widehat{Y} = \frac{X\,\widehat{Y}}{\varepsilon}$$

$$\widehat{m} = X$$

7. Consider the following quotes by a famous economist:

(a) *'In an environment where the dollar has already appreciated against the Euro and even more significantly against emerging markets currencies, fiscal stimulus here will produce an even larger current account deficit. How long will it take before politicians complain about the leakeage through the trade account and the 'gift to foreigners' that this represents?'*

(3 points) What does he mean by leakeage and 'gift to foreigners'?

Thats what I was going to ask

Debt that has to be repaid ← I think they concentrated on something diff

stim ↑ US demand

some local and some foreign

↑ leakage / gift

'The way out of this dilemma is to get the rest of the world to engage in fiscal expansion at the same time, so that the gift is returned.'

(3 points) Explain.

~~So they devalue currency ↓↓↓~~

Or they also buy our stuff - leading to exports a balance

think thats what they need

14.02 Principles of Macroeconomics
Spring 2009

Quiz 3 Solutions

1 Multiple Choice Questions (30 points)

1. If the Fisher hypothesis is true, monetary policy with respect to output:

   a. does not have an effect in the short run, but has an effect in the medium run.
   b. has an effect in the short run, but hoes not have an effect in the medium run.
   c. has an effect in both the short and medium run.

Answer b.

2. In an IS-LM model, a decrease in the expected future real interest rate

   a. does not affect either curve.
   b. shifts both IS and LM curves upward.
   c. shifts IS curve upward, does not affect LM curve.

Answer c.

3. Higher expected inflation in the US will lead to

   a. a depreciation of the US dollar vis-a-vis foreign currencies.
   b. an appreciation of the US dollar vis-a-vis foreign currencies.
   c. does not affect the exchange rates of the US dollar.

Answer a.

4. Consider an open economy with flexible exchange rates and in which the Marshall-Lerner condition holds. Suppose output is at the natural level, but there is a trade surplus. The appropriate fiscal-monetary policy mix (to achieve trade balance and natural output) is

   a. a fiscal expansion and a monetary contraction.
   b. a fiscal contraction and a monetary contraction.
   c. a fiscal expansion and a monetary expansion.

Answer a.

5. The US is running a current account deficit against the rest of the world (ROW), therefore

   a. ROW holding of US assets is increasing less than the US holding of ROW assets.
   b. ROW holding of US assets is increasing more than the US holding of ROW assets.
   c. both can happen.

Answer b.

2 Stock Market and Monetary Policy (35 points)

Consider the following dynamic economy: For each $t \geq 0$.

$$\begin{aligned} Y_{t+1} &= C_{t+1} + I_{t+1} \\ C_{t+1} &= cY_{t+1} \\ I_{t+1} &= a - bi_t \\ \frac{M_t^d}{P_{t+1}} &= Y_{t+1} - di_t \\ M_t^d &= M_t^s \end{aligned}$$

Suppose price level remains at $P = 1$ in every period. The parameters $a, b, c, d, M > 0$ satisfy

$$\begin{aligned} 0 &< c < 1 \\ a &> (1-c)M \end{aligned}$$

0. Preliminary (3 points) Suppose $M_t^s = M$ in every period, solve for the equilibirum level of output and interest rate in each period.

Solution:

$$\begin{aligned} Y &= \frac{a - bi}{1 - c} \\ M &= Y - di \end{aligned}$$

so

$$M + di = \frac{a - bi}{1 - c}$$

therefore

$$\begin{aligned} i &= \frac{\frac{a}{1-c} - M}{d + \frac{b}{1-c}} \\ &= \frac{a - (1-c)M}{d(1-c) + b} \end{aligned}$$

and

$$\begin{aligned} Y &= \frac{a - bi}{1 - c} \\ &= \frac{a - b\frac{a-(1-c)M}{d(1-c)+b}}{1-c} \\ &= \frac{ad + bM}{d(1-c) + b} \end{aligned}$$

Suppose that all output is produced and paid out as dividends by companies that are entirely owned by households, i.e., total dividends paid in period t is $\$P_tY_t$.

Final answers for stock market values should not contain infinite sums. Notice that the current value of the stock market does not account for the dividends paid in the current period, i.e., it is an ex-dividend value (meaning dividends in the current period have already been paid when you compute the value of the stock market).

1. (4 points) Assume the stock market expects that $M_t = M$ for all $t \geq 0$, calculate the nominal value of the stock market at time $t = 0$.

Solution:

$$\begin{aligned} \$Q_0 &= \sum_{t=1}^{\infty} \frac{\$PY_t}{(1+i)^t} \\ &= \frac{\frac{ad+bM}{d(1-c)+b}}{\frac{a-(1-c)M}{d(1-c)+b}} \\ &= \frac{ad + bM}{a - (1-c)M} \end{aligned}$$

2. (9 points) Suppose that at time $t = 1$, the Fed decides to expand the money supply over one period by ΔM (assume ΔM is much smaller than M). What is the value of stock market at time 1? Show that the value of stock market increases from $t = 0$ to $t = 1$.

Solution:

$$\begin{aligned} i_1 &= \frac{a - (1-c)(M + \Delta M)}{d(1-c) + b} < i \\ Y_2 &= \frac{ad + b(M + \Delta M)}{d(1-c) + b} > Y \end{aligned}$$

We have

$$\begin{aligned} \$Q_1 &= \frac{\$PY_2}{(1+i_1)} + \frac{1}{1+i_1}\$PY\frac{1}{i} \\ &> \frac{\$PY}{(1+i)} + \frac{1}{1+i}\$PY\frac{1}{i} \\ &= \$PY\frac{1}{i} = \$Q_0. \end{aligned}$$

3. (9 points) Suppose that the one time increase in money supply is expected by the financial market at time $t = 0$. What is the new value of the stock market at time $t = 0$? How does that value compare with the old value of the stock market in the Question 1? How does that value compare with the new value of the stock market in Question 2?

Solution:

$$\$Q_0' = \frac{\$PY}{(1+i)} + \frac{1}{1+i}\$Q_1$$

$$\begin{aligned} \$Q_0' &> \frac{\$PY}{(1+i)} + \frac{1}{1+i}\$Q_0 \\ &= \$Q_0 \end{aligned}$$

$$\begin{aligned} \$Q_0' &< \frac{i\$Q_1}{(1+i)} + \frac{1}{1+i}\$Q_1 \\ &= \$Q_1 \end{aligned}$$

Now suppose that at time $t = 1$ there is an increase in consumer confidence over one period that corresponds to an increase in marginal propensity to consume from c to $c + \Delta c$ (assume Δc is much smaller than c).

4. points) Suppose that the Fed decides to keep the output constant by adjusting the supply of money (ΔM). What is the new level of money supply? What is the value of the stock market at time 1? How does that value compare with the value of the stock market at time 0?

Solution

$$Y = \frac{ad + b(M + \Delta M)}{d(1 - c - \Delta c) + b}$$

so

$$b\Delta M = -Yd\Delta c$$

or

$$\Delta M = -\frac{Yd}{b}\Delta c.$$

The interest rate at time 1 increases:

$$i_1 = \frac{a - (1 - c - \Delta c)(M - \Delta M)}{d(1 - c - \Delta c) + b} > i.$$

Finally, value of stock market at time 1 is:

$$\begin{aligned} \$Q_1 &= \frac{\$PY}{(1+i_1)} + \frac{1}{1+i_1}\$PY\frac{1}{i} \\ &< \frac{\$PY}{(1+i)} + \frac{1}{1+i}\$PY\frac{1}{i} \\ &= \$PY\frac{1}{i} = \$Q_0. \end{aligned}$$

5. (9 points) Suppose that the Fed decides to keep the interest rate constant. What is the new level of money supply (ΔM)? What is the value of the stock market at time 1? How does that value compare with the value of the stock market at time 0?

Solution

$$i = \frac{a - (1 - c - \Delta c)(M + \Delta M)}{d(1 - c - \Delta c) + b}$$

so

$$\begin{aligned} -id\Delta c &= +\Delta cM - (1 - c - \Delta c)\Delta M \\ \Delta M &= \frac{M + id}{(1 - c - \Delta c)}\Delta c > 0 \end{aligned}$$

The output at time 2 increases

$$Y_2 = \frac{ad + b(M + \Delta M)}{d(1 - c - \Delta c) + b} > Y$$

Finally, value of stock market at time 2 is:

$$\begin{aligned} \$Q_1 &= \frac{\$PY_2}{(1+i)} + \frac{1}{1+i}\$PY\frac{1}{i} \\ &> \frac{\$PY}{(1+i)} + \frac{1}{1+i}\$PY\frac{1}{i} \\ &= \$PY\frac{1}{i} = \$Q_0. \end{aligned}$$

3 Open Economy (35 points)

Consider a world economy with only two countries. The home country is characterized by:

$$\begin{aligned} C &= c_0 + c_1 Y \\ I &= c_2 Y \\ \frac{IM}{e} &= mY \\ X &= \frac{x\tilde{Y}}{e} \end{aligned}$$

where $C, Y, \tilde{Y}, I, IM, X, e$ denote aggregate consumption, domestic output, foreign output, investment, imports, exports and the real exchange rate, respectively. Assume $c_0 > 0, 0 \le c_1 \le 1, c_2 > 0, 0 \le m \le 1$, $1 + m > c_1 + c_2, 0 \le x \le 1$.

The foreign country is characterized by

$$\begin{aligned} \tilde{C} &= \tilde{c}_0 + \tilde{c}_1 \tilde{Y} \\ \tilde{I} &= \tilde{c}_2 \tilde{Y} \\ \frac{\widetilde{IM}}{\tilde{e}} &= \tilde{m}\tilde{Y} \\ \tilde{X} &= \frac{\tilde{x}Y}{\tilde{e}} \end{aligned}$$

Assume that parameters in the foreign economy satisfy assumptions analog to the ones for the domestic economy.

We will assume throughout the question that the real exchange rate (e) is exogenously given.

Denote by G the amount of Government spending in the home country and by $\tilde{G}$ the amount of Government spending in the foreign country.

1. (6 points) Find the equilibrium level of output in the domestic goods market as a function of $e, G, \tilde{Y}$ and parameters. Find the multiplier (denote it by M). Find equilibrium in foreign goods market as a function of $\tilde{e}, \tilde{G}, Y$ and parameters. Find the multiplier in the foreign country (denote it by $\tilde{M}$).

   Answer:

$$\begin{aligned} Y &= c_0 + c_1 Y + c_2 Y + G + x\tilde{Y}/e - mY \\ Y &= \frac{1}{1 - c_1 - c_2 + m}\left[c_0 + x\tilde{Y}/e + G\right] \\ &\equiv M\left[c_0 + x\tilde{Y}/e + G\right] \end{aligned}$$

   where M is the multiplier. Similarly,

$$\begin{aligned} \tilde{Y} &= \frac{1}{1 - \tilde{c}_1 - \tilde{c}_2 + \tilde{m}}\left[\tilde{c}_0 + \tilde{x}Y/\tilde{e} + \tilde{G}\right] \\ &\equiv \tilde{M}\left[\tilde{c}_0 + \tilde{x}Y/\tilde{e} + \tilde{G}\right] \end{aligned}$$

2. (3 points) Does the Marshall Lerner condition hold under our assumptions? Show why or why not.

   Answer: Yes, since net exports are decreasing in the real exchange rate e:

$$NX = \frac{x\tilde{Y}}{e} - mY$$

3. (3 points) State a condition relating e and $\tilde{e}$.

   Answer:

$$e = \frac{1}{\tilde{e}}$$

4. (6 points) Solve for domestic output as a function of $e, G, \tilde{G}$ and parameters $(c_0, \tilde{c}_0, x, \tilde{x}, M, \tilde{M})$. Assume $Mx\tilde{M}\tilde{x} < 1$.

   Answer:

$$\begin{aligned} Y &= M\left[c_0 + x\tilde{M}\left[\tilde{c}_0 + \tilde{x}Y/\tilde{e} + \tilde{G}\right]/e + G\right] \\ &= M\left[c_0 + x\tilde{M}\tilde{c}_0/e + x\tilde{M}\tilde{x}Y + x\tilde{M}\tilde{G}/e + G\right] \\ &= \frac{M}{1 - Mx\tilde{M}\tilde{x}}\left[c_0 + x\tilde{M}\tilde{c}_0/e + x\tilde{M}\tilde{G}/e + G\right] \end{aligned}$$

5. (6 points) Suppose that the home country has decided to devote 100 units of the local good to boost the economy (increase home output). The Secreaty of the Treasury has proposed to use the resources to increase public spending ($\Delta G = 100$). Can the home country be better off by giving away the 100 units of the local good to the Foreign government on the condition that the goods are fully used for Foreign public spending ($\Delta\tilde{G}$)? If so, state a precise mathematical condition that guarantees your answer. If not, show why.

   Answer: Yes. Under the proposed arrangement, the foreign country would expand public spending by $\Delta\tilde{G} = 100e$. The effect on Home's output would be greater than the effect of $\Delta G = 100$ provided that

$$x\tilde{M} > 1$$

6. (5 points) Write a condition relating IM and $\tilde{X}$ and a condition relating $\widetilde{IM}$ and X. Show that each condition imposes a restriction on the parameters.

   Answer:

$$\begin{aligned} IM &= \tilde{X} \rightarrow mYe = \frac{\tilde{x}Y}{\tilde{e}} \rightarrow m = \tilde{x} \\ \widetilde{IM} &= X \rightarrow \tilde{m} = x \end{aligned}$$

7. Consider the following quotes by a famous economist:

   (a) *'In an environment where the dollar has already appreciated against the Euro and even more significantly against emerging markets currencies, fiscal stimulus here will produce an even larger current account deficit. How long will it take before politicians complain about the leakeage through the trade account and the 'gift to foreigners' that this represents?'*

   (3 points) What does he mean by leakeage and 'gift to foreigners'?

   Answer: The stimulus package increases demand by US agents. Part of it goes to local goods and services and part of it goes to foreign ones ('leakeage'). The more it goes to foreign goods the smaller the multiplier. Foreigners enjoy an increase in the demand for their products as a result of the stimulus plan ('gift').

   'The way out of this dilemma is to get the rest of the world to engage in fiscal expansion at the same time, so that the gift is returned.'

   (3 points) Explain.

   Answer: exports are a function of foreign output so the US benefits from fiscal expansion in foreign countries ('gift return').