

Chapter 10 + 11

IS-LM model

- learn how to formulate the IS; LM curves
- learn how to solve for y^{ss} ; i^{ss}
- learn how to construct the multiplier matrix
- learn how to interpret the multiplier matrix
- learn what determines
 - the sign
 - the size
 - the sensitivity } of the multiplier

PROBLEMS

7

* 1. The following equations describe an economy. (Think of C, I, G , etc., as being measured in billions and i as a percentage; a 5 percent interest rate implies $i = 5$.)

$$C = 0.8(1 - t)Y \quad (P1)$$

$$t = 0.25 \quad (P2)$$

$$I = 900 - 50i \quad (P3)$$

$$\bar{G} = 800 \quad (P4)$$

$$L = 0.25Y - 62.5i \quad (P5)$$

$$\bar{M}/\bar{P} = 500 \quad (P6)$$

- (a) What is the equation that describes the IS curve?
- (b) What is the general definition of the IS curve?
- (c) What is the equation that describes the LM curve?
- (d) What is the general definition of the LM curve?
- (e) What are the equilibrium levels of income and the interest rate?
- (f) Describe in words the conditions that are satisfied at the intersection of the IS and LM curves, and explain why this is an equilibrium.

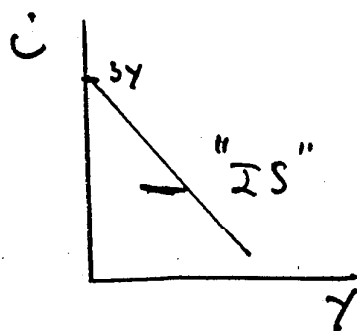
(a)

$$AS = AD$$

(b)

$$Y = C + I + G$$

• successive substitution



$$Y = 0.8(1 - 0.25)Y + 900 - 50i + 800$$

$$.4Y = 1700 - 50i$$

$$50i = 1700 - .4Y$$

$$i = 34 - .008Y$$

(c)

$$M^S = M^D$$

(d)

$$\bar{M}/\bar{P} = L$$

$$500 = .25Y - 62.5i$$

$$62.5i = -500 + .25Y$$

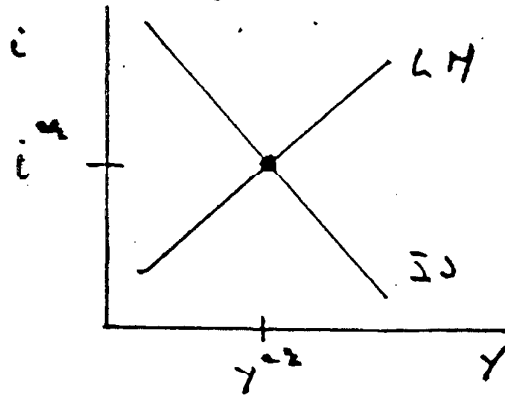
$$i = -8 + .004Y$$



(2)

(e)

(f)



(i^e, Y^e) solution of 2 linear equations
 i.e. the IS curve and the LM curve

Eqn.	i	Y	r.h.s.
IS	I	$+ .008$	34
LM	I	$- .004$	-8

SPREAD
SHEET
APPROACH

Question Successive Elimination of Variables

$$I \cdot i + .008Y = 34$$

$$I \cdot i - .004Y = -8$$

$$.012Y = 42$$

$$Y^e = 3500$$

$$i^e = 34 - (.008)(3500) = 6$$

2. Continue with the same equations.

- (a) What is the value of α_c , which corresponds to the simple multiplier (with taxes) of Chapter 4?
- (b) By how much does an increase in government spending of $\Delta \bar{G}$ increase the level of income in this model, which includes the assets markets?
- (c) By how much does a change in government spending of $\Delta \bar{G}$ affect the equilibrium interest rate?
- (d) Explain the difference between your answers to 2a and 2b.

(3)

Question 1
IS-LM model
in numbers

$$C = .8(1-t)Y$$

$$t = .25$$

$$I = 900 - 50i$$

$$\bar{G} = 800$$

$$L = .25Y - 62.5i$$

$$\bar{M}/\bar{P} = 800$$

Question 2
IS-LM model
in symbols

$$C = c(1-t)Y$$

$$t = \bar{t}$$

$$I = \bar{I} - b \cdot i$$

$$G = \bar{G}$$

$$L = h \cdot Y - h \cdot i$$

$$M/P = \bar{M}/\bar{P}$$

$$\boxed{AS = AD}$$

$$Y = C + I + G$$

$$Y = c(1-t)Y + \bar{I} - b \cdot i + \bar{G}$$

$$[1 - c(1-t)]Y = \bar{I} + \bar{G} - b \cdot i$$

$$+ b \cdot i = \bar{I} + \bar{G} - [1 - c(1-t)]Y$$

$$\boxed{IS \text{ curve}}$$

$$i = \frac{\bar{I}}{b} + \frac{\bar{G}}{b} - \frac{[1 - c(1-t)]Y}{b}$$

$$\boxed{M^S = M^D}$$

(4)

$$M/P = L$$

$$\bar{M}/\bar{P} = h \cdot \gamma - h \cdot i$$

$$h \cdot i = -\bar{M}/\bar{P} + h \cdot \gamma$$

LM curve $i = -\frac{1}{h} \cdot \frac{\bar{M}}{\bar{P}} + \frac{h}{h} \cdot \gamma$

eq.	i	γ	r.h.s	
"IS"	$I \cdot i$	$\frac{1-c(r-t)}{b}$	$(\frac{\bar{I}}{b} + \frac{\bar{G}}{b})$	SPREAD SHEET
"LM"	$I \cdot i$	$-\frac{h}{h}$	$-\frac{1}{h} \cdot \frac{\bar{M}}{\bar{P}}$	ADDITION

Gaussian successive Elimination of Variables

$$1. i + \frac{1-c(r-t)}{b} \gamma = \frac{\bar{I} + \bar{G}}{b}$$

$$2. i - \frac{h}{h} \gamma = -\frac{1}{h} \cdot \frac{\bar{M}}{\bar{P}}$$

$$\left(\frac{1-c(r-t)}{b} + \frac{h}{h} \right) \gamma = \frac{\bar{I} + \bar{G}}{b} + \frac{\bar{M}}{h \cdot \bar{P}}$$

(5)

$$\frac{h[1-c(1-t)] + k \cdot b}{bh} \cdot Y = \frac{(\bar{I} + \bar{G})k \cdot \bar{P} + s \cdot \bar{M}}{b \cdot k \cdot \bar{P}}$$

$$Y^{eq} = \frac{\frac{(\bar{I} + \bar{G})k \cdot \bar{P} + s \cdot \bar{M}}{b \cdot k \cdot \bar{P}}}{\frac{h[1-c(1-t)] + k \cdot b}{bh}}$$

$$Y^{eq} = \frac{h}{h[1-c(1-t)] + k \cdot b} (\bar{I} + \bar{G})$$

$$+ \frac{b}{h[1-c(1-t)] + k \cdot b} \cdot \frac{\bar{M}}{\bar{P}}$$

	$\Delta \bar{I}$	$\Delta \bar{G}$	$\Delta \bar{M}$
ΔY^{eq}	fill out		
Δi^{eq}			

Discuss.

review Q2