

Problem Set 1

Due *in lecture* on Tuesday, 29 September. "Box-in" your answers to the algebraic questions.

1. Policy in an IS-LM model

Suppose the real side of the economy is given by:

- | | | |
|-----|-------------------------------------|--|
| (1) | $Y = AD$ | Output equals aggregate demand – an equilibrium condition |
| (2) | $AD \equiv C + I + G$ | Definition of aggregate demand |
| (3) | $C = \bar{C}\bar{O} + c(Y - T + F)$ | Consumption function, c is the marginal propensity to consume |
| (4) | $T = \bar{T}\bar{A} + tY$ | Tax function; $\bar{T}\bar{A}$ is lump sum taxes, t is tax rate. |
| (5) | $F = \bar{F}\bar{T}$ | Transfers function; $\bar{F}\bar{T}$ is lump sum transfers. |
| (6) | $I = \bar{I}\bar{N} - bi$ | Investment function |
| (7) | $G = \bar{G}\bar{O}$ | Government spending on goods and services |

and the monetary sector is given by:

<u>Eq.No.</u>	<u>Equation</u>	<u>Description</u>
(8)	$\frac{M^d}{P} = \frac{M^s}{P}$	Equilibrium condition
(9)	$\frac{M^s}{P} = \frac{\bar{M}}{P}$	Money supply
(10)	$\frac{M^d}{P} = \mu + kY - hi$	Money demand

- 1.1 Graph the IS and LM curves on a single graph. Show the vertical intercepts, the slopes, and the intersection. Also show what each curve depends on.
- 1.2 Show what happens if government spending on goods and services are increased by ΔGO .
- 1.3 Using the same graph as in 1.2, compare what happens if government spending on *transfers* are increased by ΔFT , where ΔFT is numerically equivalent to ΔGO .
- 1.4 Show what happens if the only fiscal policy is an increase in government spending by amount ΔGO , and the Fed increases the money supply to keep the interest rate constant. What is the multiplier in this case?
- 1.5 Suppose the economy is given by equations (1)-(10), but equation (3) is given by:

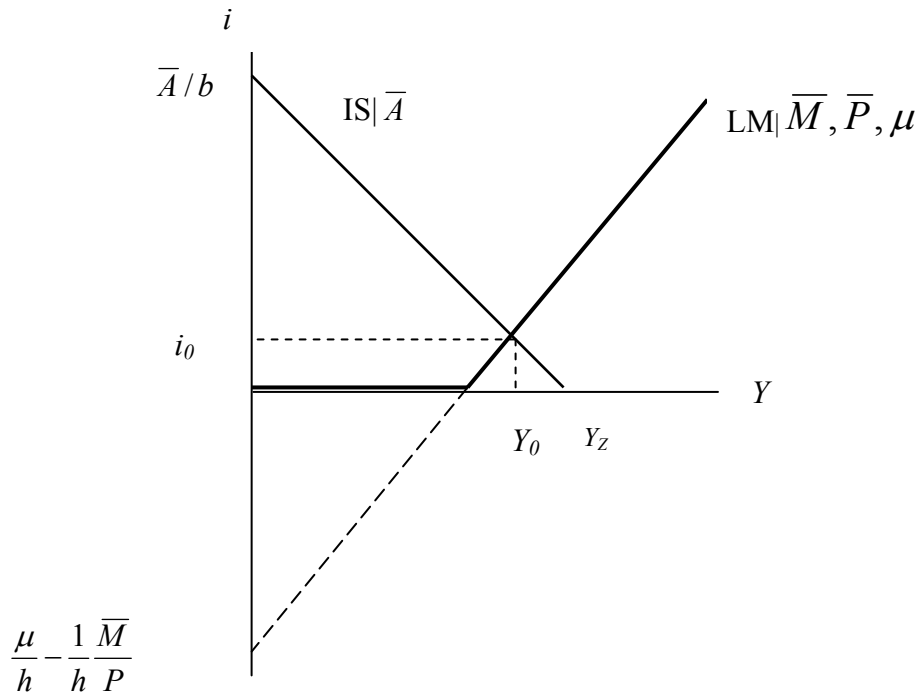
$$(3') \quad C = \bar{C}\bar{O} + c(Y - T + F) + \gamma WORTH$$

Where WORTH is net private sector household wealth (assets minus liabilities), including housing and equity. What happens when net worth falls by $\Delta WORTH$?

1.6 Compare what happens if a lump sum tax cut of \$100 billion occurs if consumers either spend or “rebuild their balance sheets” (i.e., save). For simplicity, set $c = 0.7$, $t=0$, and $\gamma=0.05$.

2. Liquidity Trap

Consider the following diagram.



- 2.1 Using the above graph, show what happens if expansionary monetary policy is used (label the curve shift assuming $\Delta(M/P)$).
- 2.2 What is the maximal impact on income that can be obtained using monetary policy?
- 2.3 Show what happens if expansionary fiscal policy is used (label the curve shifts assuming ΔGO).

3. Given an economy defined by equations (1)-(7) in problem 1, setting $t=0$, and:

<u>Eq.No.</u>	<u>Equation</u>	<u>Description</u>
(8)	$\frac{M^d}{P} = \frac{M^s}{P}$	Equilibrium condition
(9)	$\frac{M^s}{P} = \frac{\bar{M}}{P}$	Money supply
(10)	$\frac{M^d}{P} = \mu + kY - hi + j\left(\frac{\bar{M} + \bar{B}}{P}\right)$	Money demand
(11)	$BuD = G - T$	

- 3.1 Analyze the implications of running a budget deficit for one period induced by increasing government spending, assuming the initial budget deficit is zero. Use an IS/LM diagram, clearly indicating what you think happens (curve shifts, etc.)
- 3.2 Assume the initial budget deficit is very large. Show what an increase in government spending does.
- 3.3. Can monetary policy change the result obtained in 3.2? If so, show how, using an IS-LM diagram.

4. Leverage, liquidity, and bank balance sheets

- 4.1 Consider two banks, H (high bank capital) and L (low bank capital).

High Bank Capital			Low Bank Capital		
Assets		Liabilities	Assets		Liabilities
Reserves	\$9M	Deposits	\$90M	Reserves	\$10M
Loans	\$71M	Bank Capital	\$10M	Loans	\$70M
ABS	\$20M			ABS	\$20M

Bank capital is the equity of the owners (shareholders) of the bank. ABS stands for asset backed securities.

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 2%.

4.2 Show what happens to each of the bank balance sheets when the asset backed securities lose 25% of their value.

4.3 Now consider two banks, one which borrows a nothing short term, and one that borrows a lot on short term money markets.

Bank Deposit Based			Money Market Based		
Assets		Liabilities	Assets		Liabilities
Reserves	\$6M	Deposits	\$60M	Reserves	\$3M
Loans	\$74M	Short term	\$30M	Loans	\$77M
				borrowing	
ABS	\$20M	Bank	\$10M	ABS	\$20M
		Capital			Capital

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 2%, and the interest rate on short term borrowing is 1%.

4.4 Show what each bank must do when short term money markets freeze, so that the banks cannot continue to borrow short term.