

Problem Set 2

Due in Lecture on Monday, March 24th. "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:

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| (1) | $Y = AD$ | Output equals aggregate demand – an equilibrium condition |
| (2) | $AD \equiv C + I + G + EX - IM$ | Definition of aggregate demand |
| (3) | $C = \overline{C\bar{O}} + c(Y - T + F)$ | Consumption function, c is the marginal propensity to consume |
| (4a) | $T = \overline{T\bar{A}} + tY$ | Tax function; $\overline{T\bar{A}}$ is lump sum taxes, t is tax rate. |
| (4b) | $F = \overline{F\bar{T}}$ | Transfers function; $\overline{F\bar{T}}$ is lump sum transfers. |
| (5) | $I = \overline{I\bar{N}} - bi$ | Investment function |
| (6) | $G = \overline{G\bar{O}}$ | Government spending on goods and services |
| (7) | $EX = \overline{EX\bar{P}} + vq$ | Export spending |
| (8) | $IM = \overline{IM\bar{P}} + mY - nq$ | Import spending |

and the monetary sector is given by:

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

For now, we ignore the external balance condition.

- 1.1 Solve for the IS curve, with Y on the left hand side. No credit unless you show your work.
- 1.2 Solve for the LM curve, with i on the left hand side. No credit unless you show your work.
- 1.3 Graph the IS and LM curves on a single graph. Show the vertical intercepts, the slopes, and the intersection.
- 1.4 Solve for equilibrium income. Show the steps in your work.
- 1.5 Calculate the change in income resulting from a given change in transfers, ΔFT .
- 1.6 Calculate the change in income for a given change in money supply, $\Delta(\bar{M} / P)$ (you can assume that the price level P is fixed at 1).

- 1.7 Show graphically what happens when the real money stock is increased. Clearly indicate the distance of the curve shifts and the amount of the income change.
- 1.8 Suppose instead that the interest sensitivity of investment were very high. Show graphically the effect upon output and interest rates that results from an increase of the real money stock. Clearly indicate the distance of the curve shifts and the amount of the income change.

2. Policy under Fixed Exchange Rates in the IS-LM-BP=0 model

Suppose the economy is given by the following set of equations.

$$(13) \quad Y = \bar{\alpha}[\bar{A} + \bar{EXP} - \bar{IMP} + (n + v)q - bi] \quad \text{<IS curve>}$$

$$(13') \quad i = \frac{\bar{A} + \bar{EXP} - \bar{IMP} + (n + v)q}{b} - \left(\frac{1 - c(1 - t) + m}{b} \right) Y \quad \text{<IS curve>}$$

Where $\bar{A} \equiv \bar{CO} - b\bar{TA} + b\bar{FT} + \bar{IN} + \bar{GO}$

$$(14) \quad i = \frac{\mu}{h} - \left(\frac{1}{h} \right) \left(\frac{\bar{M}}{P} \right) + \left(\frac{k}{h} \right) Y \quad \text{<LM curve>}$$

$$(15) \quad i = - \left(\frac{1}{\kappa} \right) [(\bar{EXP} - \bar{IMP} + \bar{KA}) + (n + v)q] + \bar{i}^* + \left(\frac{m}{\kappa} \right) Y \quad \text{<BP=0 curve>}$$

- 2.1 Draw a graph of initial equilibrium, where the goods and money markets are in equilibrium, as is the balance of payments. Assume that $m/\kappa > k/h$.
- 2.2 Show what happens if the government increases transfers by ΔFT , both immediately, and over time in the absence of central bank sterilization. Note, the money base changes by an amount equal to the change in foreign exchange reserves,

$$(16) \quad \Delta MB = \Delta Res = BP = -ORT$$

- 2.3 Answer 2.2, assuming the central bank sterilizes changes in official reserves. At the new equilibrium, what is true about (i) the level of output; (ii) the level of investment; (iii) the real exchange rate; and (iv) the trade balance?
- 2.4 Redraw 2.1, and show the impact of a monetary expansion, both immediately and over time. Assume over time, capital flows are sterilized.
- 2.5 Explain why the process you lay out in 1.4 occurs.
- 2.6 Answer 2.4 if capital flows are *not* sterilized.
- 2.7 Does your answer to 2.5 change if $m/\kappa < k/h$?