

**QUESTION 1: TRUE, FALSE or UNCERTAIN.**

**20 points**

Explain your answer completely but briefly.

1. An expansionary monetary policy lowers the natural ~~rate~~ level of output. (5 points)

FALSE, the natural rate of output depends on the structural parameters of the economy;  $z, \mu, (A)$   
 $Y_n = N_{n,c} = L(1 - u_n)$  where  $u_n = F(u_n, z) = \frac{1}{1+\mu}$   
which are not affected by M.P.

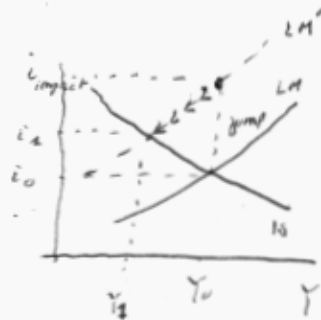
(SORRY!)

2. When an economy opens to trade and subsequently increases the degree of competition faced by producers in the final goods market, the natural rate of unemployment increases. (5 points)

FALSE, more competition implies a lower mark-up, thus a higher real wage and therefore a lower  $u_n$  / PS shifts up)

3. In a dynamic context, a monetary contraction is followed by an immediate increase in the interest rate. The new interest rate (at impact) is higher than the final equilibrium interest rate. (5 points)

True: a monetary contraction shifts the LM up. Given the dynamic analysis: the economy adjusts on the LM, therefore the interest rate jumps at impact to decline slowly towards the new eqbm



4. There are 2 countries in the world, A and B, which maintain a fixed exchange agreement. Country A has experienced higher GDP growth and higher inflation than country B. The worsening of A's trade balance over this period should come as no surprise. (5 points)

~~Trade~~  $i$  higher GDP growth  
 implies  $\frac{Y^A}{P^A} > \frac{Y^B}{P^B}$   $i > 0$  this  $\uparrow$   
 while  $\pi^A > \pi^B \Rightarrow E = \frac{EP^B}{P^A} \downarrow$ ,  $NX \downarrow$   
 both effects  $\Rightarrow NX \downarrow$ .

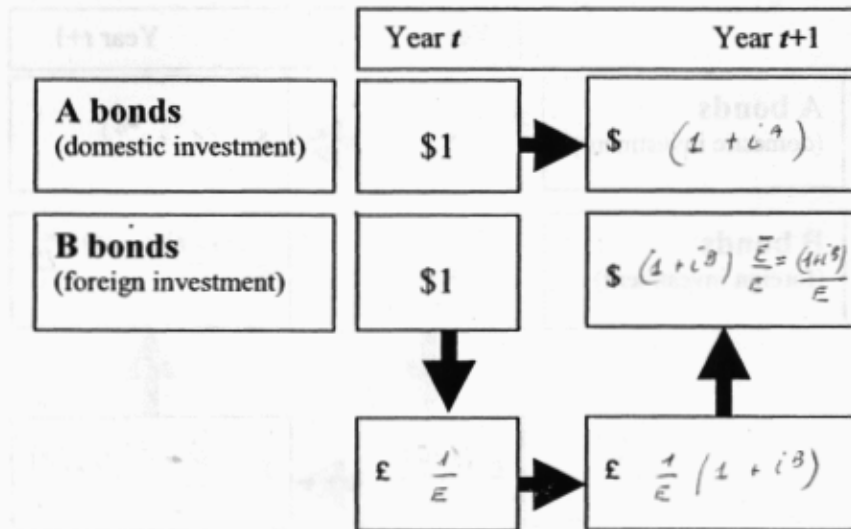


Figure 1:

### QUESTION 2: 40 Points

Consider two identical economies, A and B, that trade among themselves and that have flexible exchange rate regimes. Residents have the choice of holding foreign or domestic bonds with interest rates  $i^*$  and  $i$ . Assume there is perfect capital mobility, the Marshall-Lerner condition holds (i.e.: a depreciation leads to an improvement in the trade balance) and the expected future exchange rate is equal to one.

1. State the (uncovered) interest rate parity condition and explain in detail what is being arbitrated by filling in the blanks in the diagram above.

the uncovered interest rate parity says  
that you must be indifferent between  
investing in A ~~or~~ B this from  
the above diagram:  $(1 + i^A) = \frac{1}{\epsilon} (1 + i^B)$   
 $\Rightarrow$   $i^A = i^B + \frac{1 - \epsilon}{\epsilon}$

2. Now assume the government in country A doesn't like the idea that people buy foreign assets. For that purpose, they impose a tax as follows: For



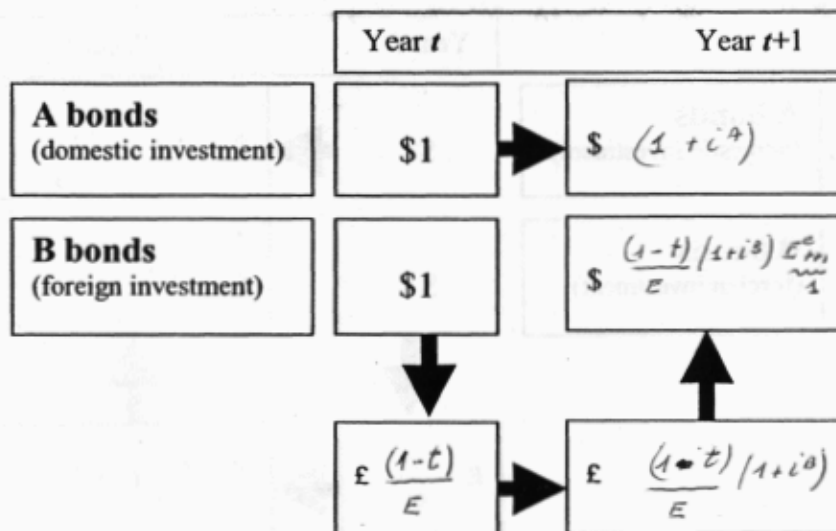


Figure 2:

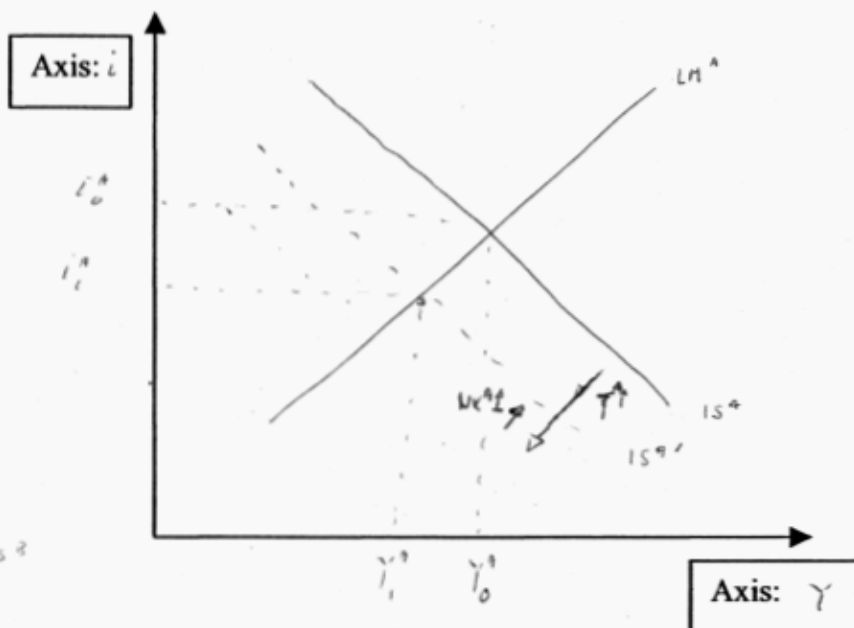
every unit of domestic currency used to purchase foreign currency, they must pay a tax  $t$  (also in domestic currency). Fill in the blanks in the diagram above, and use it to determine the new interest parity condition.

Now when they change  $\$1$  into  
 $\text{£}$  they have to pay  $t$  taxes  
 the UIP becomes:  $(1+i^A) = (1+i^B) \frac{(1-t)}{E}$

3. Let us now go back to the initial situation (i.e.: no tax on purchases of foreign currency). Suppose income taxes in country A are increased. Plot the IS-LM graphs for both countries, indicating any changes in them as a result of this new policy.

$T^A \downarrow \Rightarrow (Y^A - T^A) \downarrow \Rightarrow C^A \downarrow \Rightarrow Y^A \downarrow$  :  $IS^A$  shift left  
 but  $Y^A \downarrow \Rightarrow M^U^A \downarrow \Rightarrow i^A \downarrow$  thus  
 from  $i^A = i^B + \frac{1-R}{E}$ ,  $E \downarrow$   
 and you have a depreciation in  $A \Rightarrow NX^A \uparrow \Rightarrow Y^A \downarrow$   
 in  $B$ , given  $Y^A \downarrow$ ,  $Q^B \downarrow$ ,  $NX^B \downarrow$ ,  $IS^B \downarrow$

in B



4. Fill in the blanks of this chart with symbols indicating whether each of the following variables increases (+), decreases (-), remains unaffected (=) or cannot be determined (?).

- |          |          |
|----------|----------|
| $Y_a$ -  | $Y_b$ -  |
| $C_a$ -  | $C_b$ -  |
| $NX_a$ + | $NX_b$ - |
| $i_a$ ?  | $i_b$ ?  |
| $E_a$ +  | $E_b$ -  |



### QUESTION 3: Small versus Large Economy (40 points)

Suppose there are two types of countries in the world, small and large. The behavioral equations for the small country are:

$$C = \alpha Y$$

$$I = \beta Y - \gamma i$$

$G$  given (exogenous)

$$NX = \delta Y^* - \lambda Y - \mu^s \frac{1}{E}$$

where the superscript "s" denotes small, and we have assumed that prices are fixed so  $e = E$ . There are similar behavioral equations for the large country:  $\mu^s > \mu^l$ .

1. What does our theory tell us about the relation between  $E$  (defined as in class and textbook) and net exports?

An exchange rate depreciation should  
 lead to an increase in our net exports  
 $E \uparrow \Rightarrow NX \uparrow$   
 thus  $\mu^s > 0$

2. Now suppose  $E_{t+1}^e = \bar{E} = 1$ . Also suppose that the world interest rate is described by:  $i^* = (1 - a^s) \bar{i}^* + a^s i$ , where  $\bar{i}^*$  is dependent on economic conditions in rest of world and  $a^s$  is the weight of the domestic interest rate for the small country.

(i) Use the arbitrage condition from trading domestic versus foreign assets and derive  $E$  as a function of  $i$ . Plot with  $E$  on the y-axis.

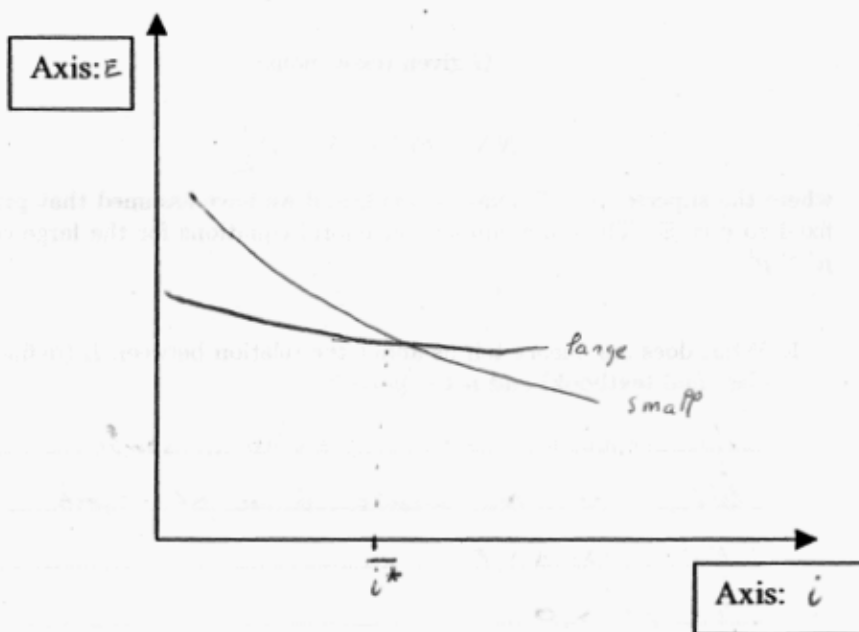
(ii) Plot on the same graph the relation for a large country, that is  $a^l > a^s$ . Interpret the different slopes. Where do the two curves intersect?



$$\text{from } i = i^* + \frac{E^s - E_t}{E_t}$$

$$\text{you obtain } i = \bar{i} = \frac{1}{1 + (1 - a^j)(\delta - i^*)}, \quad j = s, p$$

$a^p > a^s$ ; large country exchange rate reacts less to domestic interest rate



3. Now solve for the goods market equilibrium in each country. What is the slope of the IS (with  $i$  on the y-axis)? Plot the two curves for a small and large country respectively ( $\mu^l$  versus  $\mu^s$ ). How do they compare?

$$Y = Z, \text{ solving } \rightarrow Y = \alpha Y + \beta Y - \delta i + G + sY^* - \alpha Y - \mu^j \frac{1}{E}; \quad j = p, s$$

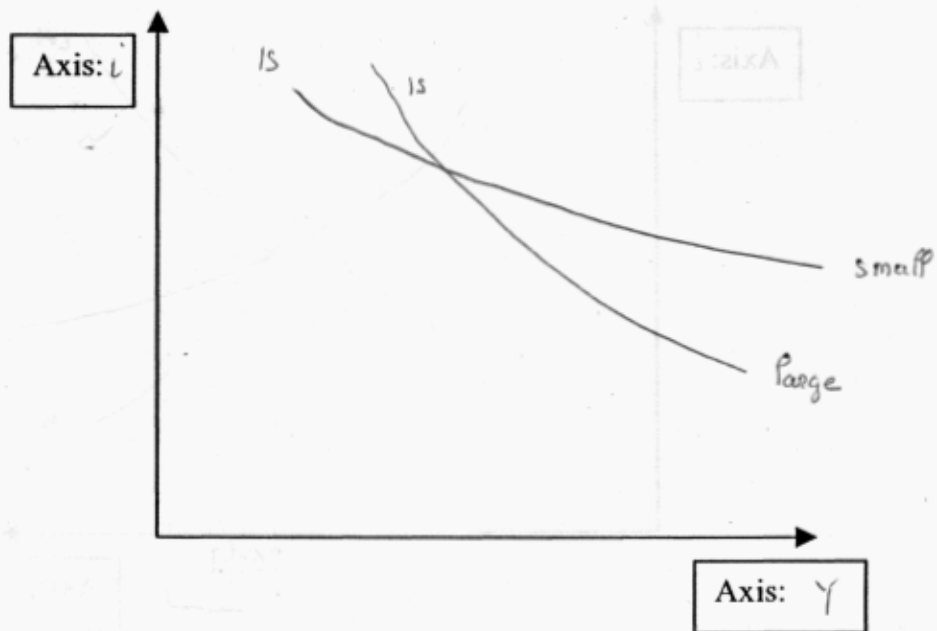
$$\bar{E} = \frac{1}{1 + (1 - a^j)(\delta - i^*)}, \text{ plug it into } \rightarrow$$

you get the IS, the slope

$$\text{turn out to be } \frac{\delta i}{sY} = - \frac{1 - \alpha - \beta + \delta}{\delta + \mu^j (1 - a^j)}, \quad j = p, s$$

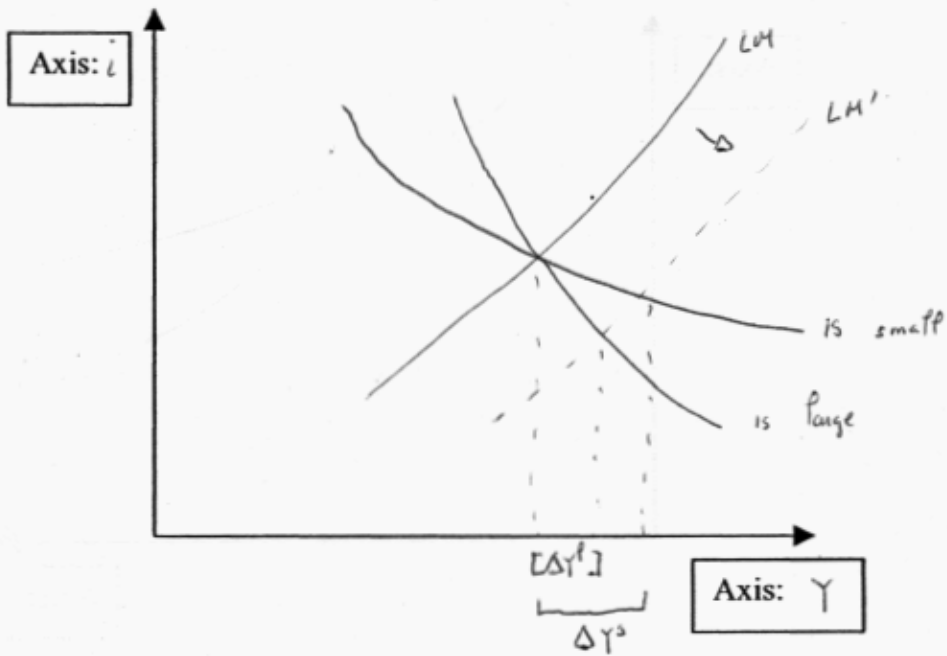
note  $\mu^p (1 - a^p) < \mu^s (1 - a^s)$ , given  $\left. \begin{array}{l} \mu^p \text{ respond more} \\ \text{in small country } (\mu^s > \mu^p) \end{array} \right\}$





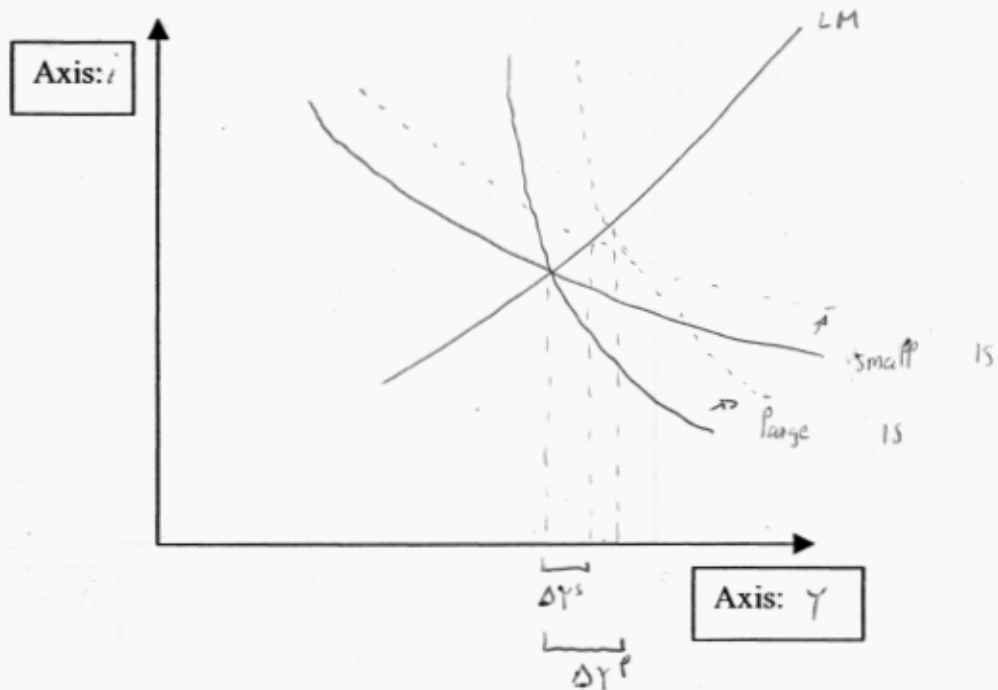
4. Now include a standard LM curve in the same  $(i, Y)$  space. Analyze the effect of a monetary expansion in the two countries. In which country is monetary expansion more effective (in terms of altering  $Y$ )?

M.P. has larger effect  
 on small country  
 (flatter IS  $\Rightarrow$  larger impact of  $i$ )



5. Now analyze the effects of a fiscal expansion in either country. Where is fiscal policy more effective?

in large country  
 for the IS the fiscal multiplier is  
 large:  $\frac{1}{1 - \alpha - \beta + 2 + (\delta + \mu \delta (1 - \alpha^2)) \frac{\delta}{h}}$ ;  $\delta = \rho, s$   
 (where  $M^d = -h i + f Y$ )



6. Now, assume investment in the small country does not depend only upon the interest rate and the level of output as usual. Investment in the small country will also depend on the cost of intermediate goods, whose price is completely determined by the exchange rate. How does this change the IS and the LM if at all? Does this affect the effectiveness of a change in monetary policy?

the IS becomes  $Y = A(Y, i, E(t)) + NX(E(t), Y)$

the IS is steeper

M.P. is less effective