

## Midterm Exam I: Answer Sheet

1. (20%) Consider an economy operating under a fixed exchange rate regime. Suppose that in the current period the market clearing exchange rate is higher than the fixed exchange rate.

- (a) What type of transactions must the monetary authorities engage in to maintain the fixed exchange rate at its current level?

**brief answer** If  $e$  is the dollar price of foreign exchange, then there is an excess supply of dollars and an excess demand for foreign exchange – hence, without intervention the price of foreign exchange would increase (draw a supply-demand diagram). To prevent  $e$  from rising to the market rate the monetary authorities must buy dollars and sell foreign exchange.

- (b) How would this transaction appear in the country's balance of payments? [hint: credit or debit and in which account]. What would it be offsetting elsewhere?

**brief answer** In the *ORT* there is a credit equal to the sale of foreign exchange, as our *CB* is selling foreign currency in exchange for dollars. This offsets the debit in either current account or capital account. All we know for sure, is that in this case  $CA + KO < 0$  so  $ORT > 0$ .

- (c) Can the monetary authorities engage in this activity forever?

**brief answer** No. The problem is that the *CB* has only a finite stock of foreign currency. If the imbalance persists the *CB* will eventually run out of reserves. Of course the other *CB*'s – which are selling their own currencies and buying dollars can continue doing this forever.

- (d) Suppose that people come to believe that the authorities will have to adjust the exchange rate. What will happen to rates of return denominated in domestic currency relative to those denominated in foreign currency? Explain.

**brief answer** If agents expect that the dollar will be worth less in the future they will demand a premium to hold dollar assets. So US interest rates will rise relative to interest rates on assets denominated in foreign currencies.

2. (20%) Consider the economy of Macronesia (which is small despite its name). Here people have access to world capital markets but they choose neither to borrow or lend. In a two-period diagram draw production opportunities and indifference curves for Macronesia, and draw the world interest rate. Label the consumption point as  $A$ .

**brief answer** the production possibilities curve and the indifference curve are tangent to each other and the budget line with the slope  $1 + \hat{r}$  where  $\hat{r}$  is the world interest rate (see figure 1):

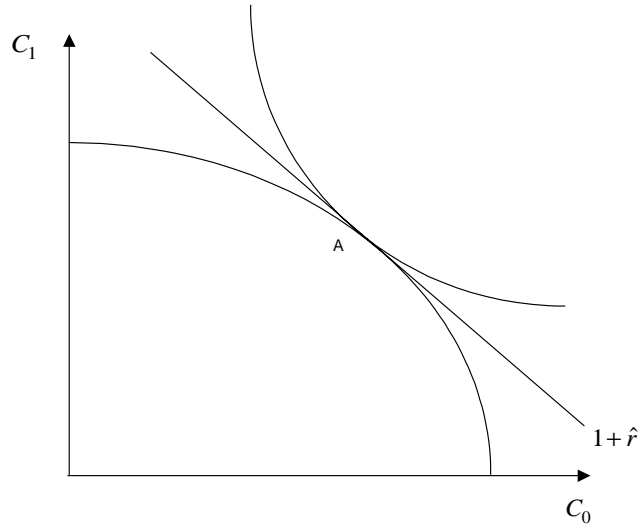


Figure 1:

3. (a) Imagine that a great innovation is discovered which will greatly increase future income in Macronesia. How does the production opportunities set shift? What would happen to consumption if Macronesia did not have access to world capital markets? Label this consumption point  $B$ .

**brief answer** Slope becomes steeper as there are more opportunities for future production. If there were no access to world capital markets then consumption would shift towards the future; hence, present consumption would likely decrease (see figure 2)

- (b) What happens to the autarky rate of interest in Macronesia? Explain.

**brief answer** The autarky rate rises, as the interest rate where there is no desire for trade in future goods requires a higher rate to reflect the higher production opportunities.

- (c) If Macronesia has access to the world capital markets what happens to production and consumption? Explain. Label the new consumption point  $C$ .

**brief answer** Macronesia will produce where  $1 + \hat{r}$  is tangent to the production line. This will involve more future production. It will then borrow against this to finance current consumption. Current consumption will be higher than in part (b), see figure 3:

- (d) Suppose Macronesia was a large economy. What would happen to the world interest rate given this discovery?

**brief answer** The world interest rate would rise, because Macronesia is now dissaving. This causes an excess world demand for current consumption, so the price must rise.

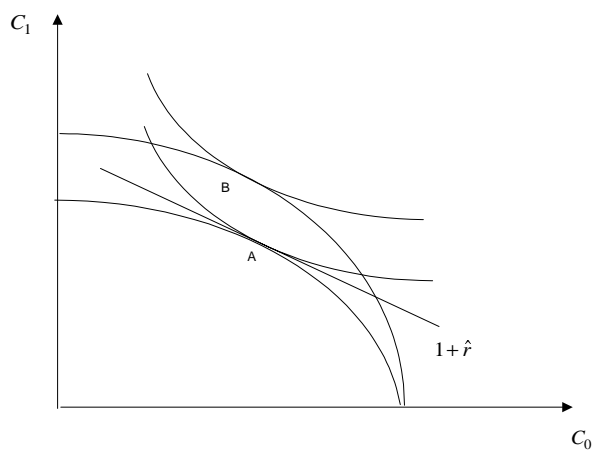


Figure 2:

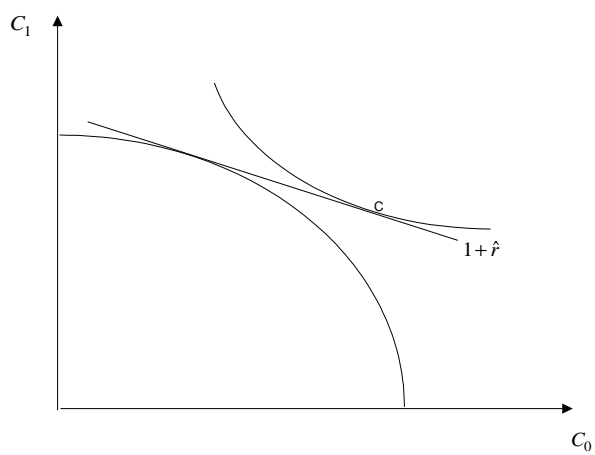


Figure 3:

3. (30%) Consider the simple Keynesian model of income determination in the open economy. Domestic absorption in this model is given by

$$A = \bar{A} + \alpha Y - \beta r \quad (1)$$

where  $Y$  is real output (recall that prices are fixed in the model),  $r$  is the real rate of interest, and  $\alpha$  is less than one. The trade balance (net exports) can be written as

$$NX = \bar{T} - mY + \phi q \quad (2)$$

where  $q$  is the real exchange rate, and  $\bar{T}$  is the autonomous trade balance.

- (a) In equation (2) the effect of a change in  $q$  on  $NX$  is positive. Why might we expect this to be true? Is this more likely to be true in the short run or the long run? Explain.

**brief answer** It is likely to be true if exports and imports are sensitive to the relative price,  $q$ . The more sensitive to this price the more likely the trade balance will rise, because it will offset the increased cost of imports when the real exchange rate increases. This effect is more likely in the longer run because exports and imports will adjust more fully with time, while the price effect is instantaneous.

- (b) Graph  $NX$  as a function of  $Y$ . How does this function shift if  $q$  rises or if foreign income decreases?

**brief answer**  $NX$  is a decreasing function of  $Y$ , due to the fact that imports rise with income. If  $q$  increases the curve shifts upwards. If foreign income rises the curve also shifts upwards (because  $\bar{T}$  rises).

- (c) Define  $Y - A$  as  $S-I$ . Draw the  $S-I$  curve as a function of  $Y$ . How would this function shift if the interest rate fell or if government spending increased.

**brief answer** This is a positive function of income, and has an intercept at  $-\bar{A} + \beta r$ . The slope of this curve is equal to  $1 - \alpha$  (see figure 4):

- (d) Explain why  $S-I = NX$  is the equilibrium condition for the goods market.

**brief answer** Equilibrium in the goods market means that income equals aggregate demand, or  $Y = C + I + G + NX = A + NX$ . Hence,  $Y - A = NX$  is just an equivalent way to write the condition. The point is that total income can be spent either on domestic goods (absorption) or foreign goods (net exports).

- (e) Suppose that at the initial equilibrium in the goods market that  $NX > 0$ , but that  $Y$  is below the full-employment level of output. We have two policy instruments: expenditure changing and expenditure switching. If we wish to have full employment and a trade balance equal to zero, what is the appropriate assignment of instruments to targets? Why does it matter?

**brief answer** We should use expenditure changing to shift  $S - I$  down, perhaps by increasing government spending or cutting  $r$ . This would raise income but cause net exports to decrease. We should then use expenditure switching (changes in  $\bar{T}$  or  $q$ ) to shift  $NX$  upwards (see figure 5). Because initially  $NX > 0$  we could get away with the opposite assignment in this case, but in general it would be problematic. The only reason it is not in this case is that for both targets we need to raise  $Y$ .

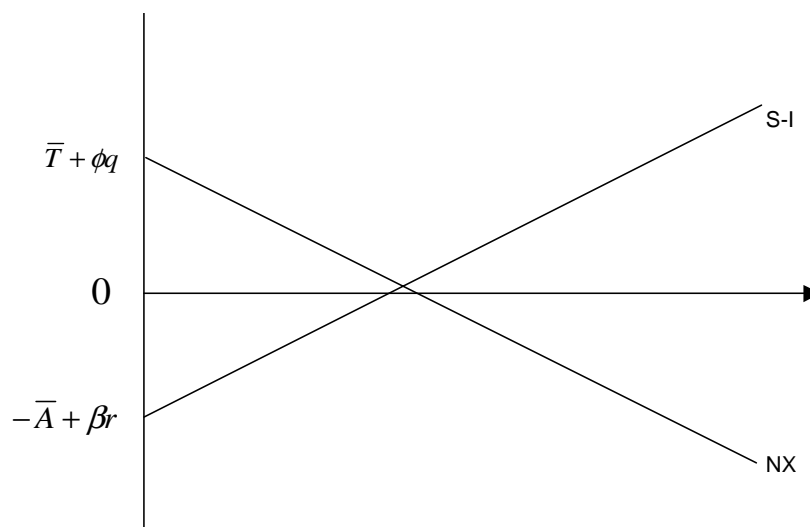


Figure 4:

Suppose, however, that initially  $NX < 0$ . Then improving the trade balance would move us farther from full employment. In that case we need to use the policy with the comparative advantage to the target, and expenditure switching has a comparative advantage with respect to the trade balance.

4. (30%) Consider an closed economy operating under the gold standard. Suppose that initially the price level is in long-run equilibrium. Now suppose that a new discovery of gold occurs (within the country), so that the cost of producing gold is lower.

- (a) What happens to the price level (relative to the price of gold) in the new equilibrium?

**brief answer** The new equilibrium would have a higher price level relative to gold, as the stock of gold would be higher. See figure 6 where the increased production of gold (from  $h_0$  to  $h_1$ ) causes the stock to rise and the relative price of gold to fall.

- (b) Now suppose that the economy is open. Analyze the effects of the gold discovery (again assume it is a domestic discovery). What happens to the price level (relative to the price of gold)? Will the price level change more or less than in part (a)? Explain.

**brief answer** Gold supply again will increase the price level relative to gold. But our higher domestic price level makes us less competitive in world markets. This will cause our trade balance to deteriorate and gold to flow out of the country. This will offset the increase in gold to some extent. Hence, in the equilibrium the price level will not rise as much. Some of the gold is used abroad in this case. In part (a) the rise in our price level depends on the total increase in gold compared with the domestic demand for gold. In the open economy it is the world demand for gold that is critical.

- (c) Suppose that the monetary authorities in this economy wanted to prevent the price movements that you derived in part (b). What policies might they pursue to accomplish this? If they adhere to the gold standard will these policies work in the long run? Explain.

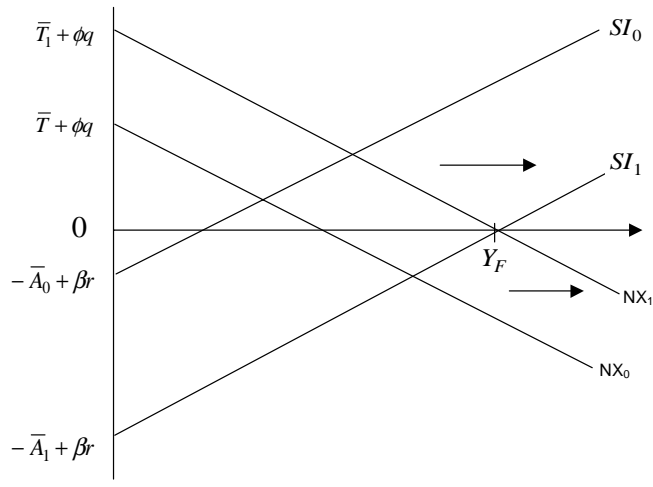


Figure 5:

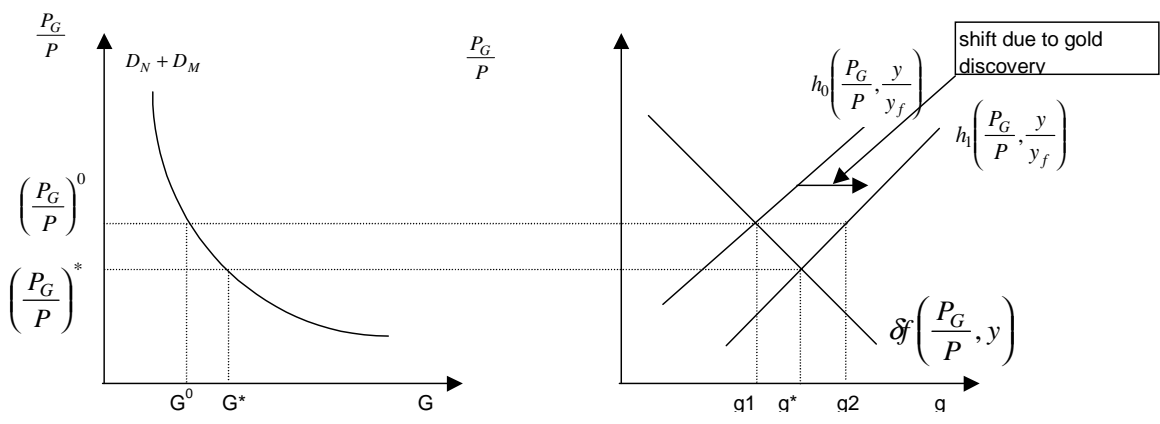


Figure 6:

**brief answer** To prevent the domestic price level from initially increasing is easy: the authorities could increase the demand for monetary gold by increasing the reserve ratio. This would offset the rise in the gold stock, leaving total money stock unaffected. Because the relative price of gold does not fall the gold stock will continue to increase and the authorities must continue to tighten monetary policy. But it is feasible as we keep accumulating gold.

- (d) Now suppose that instead of a gold discovery there was an exogenous increase in real income in the economy. What happens to the demand for gold? What happens to the price level (relative to the price of gold) in the open economy version of the model? What happens to restore equilibrium? If the adjustment to equilibrium takes time why might the gold standard be stressful? Explain.

**brief answer** The demand for gold increases. At given gold stocks the relative price of gold increases. The fall in the price level makes us more competitive. Our net exports increase and gold stocks rise, restoring the relative price of gold to its initial level. If this adjustment takes a long time then we will have a falling price level in the interim. This could cause deflationary pressures and recession. If the adjustment is slow policymakers may wish to act before the automatic adjustment takes place.