Economics 102
Introduction to Macroeconomics
Prof. Alan Deardorff
Midterm Exam 2 – Answers

March 22, 1999

PART A: Multiple Choice
points each: 48 points total)

1. **b**
2. **a**
3. **d**
4. **d**
5. **e**
6. **d**
7. **e**
8. **e**
9. **d**
10. **c**
11. **e**
12. **e**
13. **e**
14. **c**
15. **e**
16. **a**

PART B: Written Answer
(50 points total)

B1. Imagine an economy in which (i) the required reserve ratio is 20%; (ii) no individuals hold any money as cash and banks always lend to their limit; and (iii) the money supply is currently equal to $50,000.

(a) What is the value of the money multiplier in this economy? Interpret this number. (2 points)

The money multiplier is equal to one divided by the required reserve ratio. In this case then the money multiplier is equal to 5 (i.e. 1/0.2).

The money multiplier tells us how much extra money can be created (or destroyed) given $1 more (or less) money in the banking system. In this case, if $1 extra is deposited into a bank, then $5 worth of new money is created. Or if $1 were withdrawn from the bank this would mean a total of $5 would be destroyed.

(b) What is the level of Total Reserves in this economy? What is the value of Total Loans in this economy? What are Total Demand Deposits equal to? (3 points)

We know that the money supply is currently equal to $50,000, and that this is an economy in which no individuals holds any money as cash. Hence the level of Total Demand Deposits are equal to $50,000. The required reserve ratio is 20%, which means that there must be $10,000 worth of Total Reserves.

Looking at the balance sheet of the bank (see table below) this means that the bank has been able to lend out $40,000 of Total Demand Deposits. That is, it lends out all that it is not required to hold as reserves.

Banks' Balance Sheet

ASSESTS	**LIABILITIES**
Total Reserves = $10,000	**Total Demand Deposits = $50,000**
Total Loans = $40,000	

(c) Suppose that the Central Bank of this economy decides that it wants to use open market operations to *decrease* the Money Supply to $40,000. Will the Central Bank have to buy or sell bonds in order to achieve this change in the money supply? What is the dollar value of the bonds it should buy or sell? (3 points)

If the money supply is going to decrease, then the bond transaction must involve the Fed removing money from the economy. If the Fed *sells* a bond, this removes money from the economy.

What would the dollar value of the bond be? We know that in order to buy these bonds, individuals will need to withdraw money from banks (as they can't pay for the bonds with cash, as they don't hold any cash). For every dollar that is withdrawn from the banking system, the money supply will fall by $5. So if the Fed wants the money supply to fall by $10,000, they should ensure that $2,000 is withdrawn from banks. So selling $2,000 worth of bonds will achieve the desired decrease in the money supply.

(d) If the open market operation from (c) goes ahead, what will the new level of Total Reserves be in this economy? What will be the new value of Total Loans? What is the new level of Total Demand Deposits? (3 points)

We still have the money supply equal to Total Demand Deposits, but these have fallen now to $40,000. The new level of Total Reserves must be 20% of this, which is equal to $8,000. That is, Total Reserves have fallen by $2,000. Note that this makes sense, because this is the amount that the Fed effectively withdrew from the economy by selling the bonds). Again, from the balance sheet we can see that Total Loans must be $32,000 now.

Banks' Balance Sheet

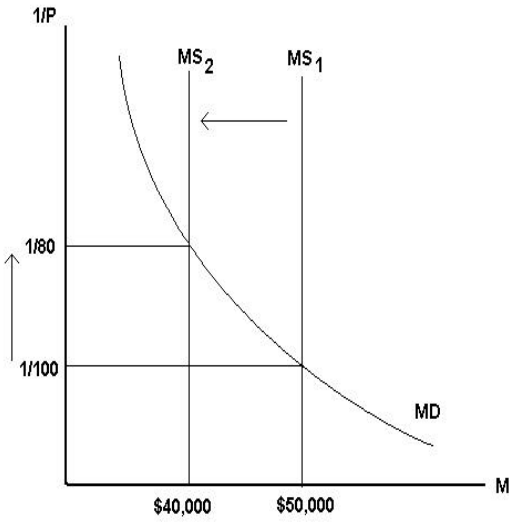
ASSESTS	**LIABILITIES**
Total Reserves = $8,000	**Total Demand Deposits = $40,000**
Total Loans = $32,000	

(e) Assuming that money is neutral in this economy, what would you expect the rate of inflation or deflation to be, if the only change that takes place throughout this year is the above decrease in the money supply? If the price level last year was 100, what is it this year? Draw a diagram showing the relationship between the money supply and the price level in this economy (3 points)

If money is neutral in this economy, this would mean that the decrease in the money supply would have no effect on real variables. In particular, the decrease in the money supply would have no effect on real GDP. Looking at the quantity equation:

$M \cdot V = P \cdot Y$; where M is the nominal money supply;
V is the velocity of money;
P is the price level; and
Y is real GDP,

We can see that if M decreases and this has no effect on real GDP then, ceteris paribus, it must be the case that the price level decreases in order for the equality above to hold. In fact, it must be the case that the percentage decrease in the price level must be exactly equal to the percentage decrease in the money supply. The money supply fell from $50,000 to $40,000, which is a 20% decrease. So the price level must also fall by 20%. Which would make the new price level equal 80. The rate of inflation is equal to –20% (or the rate of deflation is equal to 20%). This is illustrated below.



B2. This question is comprised of three statements. You must say whether these are true, false or uncertain and EXPLAIN WHY. Your explanation will solely determine the grade you receive. *If you simply write "true", "false", or "uncertain" without an explanation you will receive* ***NO CREDIT.***

(a) In order to achieve a given increase in the money supply through open market operations, the Central Bank must buy fewer bonds if individuals hold some fixed fraction of their money as cash than they would have to buy if individuals hold no cash. (7 points)

FALSE. If individuals begin holding a fixed fraction of their money as cash, this means that not all the money in the economy passes through the banking system. Where no individuals hold any money as cash, every time someone gets some extra money it is immediately re-deposited into a bank. Then the bank is able to lend out (1 – required reserve ratio) of this re-deposited amount, which creates extra money. Now if individuals begin holding cash then less money is re-deposited so less money can be lent out and hence less money is created. Essentially, the money multiplier has less power now. So in order to increase the money supply by a certain amount, the Fed must actually buy *more* bonds than they would have to if no-one held any cash, as the money creation process is weaker now.

(b) The theory of Purchasing Power Parity tells us that the nominal exchange rate and the domestic/foreign price ratio will adjust so that net exports are always equal to zero. (6 points)

FALSE. The theory of Purchasing Power Parity (PPP) tells us that in the absence of transportation costs, the real exchange rate for tradable goods will equal one. This does not imply that the value of exports must equal the value of imports.

(c) If Congress wishes to fund new spending by issuing bonds rather than by increasing taxes, this will lead to more inflation if the bonds are bought by the Fed than it would if the bonds were bought by Professor Deardorff. (7 points)

TRUE. Suppose initially that Congress issues bonds to finance an increased level of Government Purchases, and that these bonds are purchased by the Fed. We know that when the Fed purchases bonds, it increases the money supply, and that in the long run this increase in the money supply will lead to inflation. Contrast this with the case where Professor Deardorff buys the bonds. In this case there is no increase in the money supply, as the increase in the Congress's money holdings is just off-set by a decrease in Professor Deardorff's money holdings. The fact there is no change

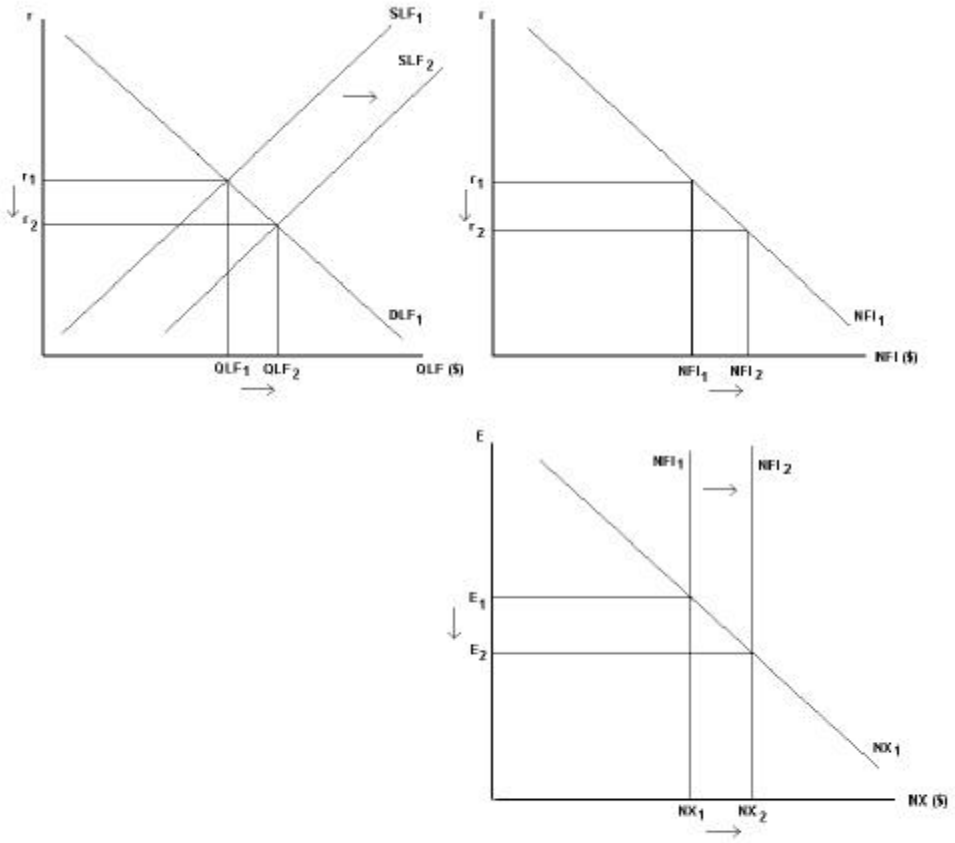
in the money supply here means that there are not the inflationary effects from this bond sale as there were in the case where the Fed bought the bonds. As a result, there is less inflation caused if Professor Deardorff buys the bonds than if the Fed does.

B3. Using both words AND diagrams in the context of Mankiw's Open Economy Model, explain the effect (if any) of each of the following on the US real interest rate and the US real exchange rate. Make certain to *clearly* label all your diagrams.

(a) An increase in taxes leads to an increase in the government budget surplus. (6 points)

The way in which this effects the market for loanable funds depends on what you assumed about how consumption responds to the tax increase. The tax increase decreases consumers' disposable incomes, by the amount of the tax increase. How might consumers respond to this decrease in disposable income? Probably, *both* their consumption and savings will change. For instance, if their disposable income falls by $100, then perhaps their consumption will fall by, say, $80 and their savings will fall by $20. If we assume that consumption does indeed decrease following a decrease in disposable income, the it must be the case that overall, national savings increases. Government savings increases by the amount of the increase in taxes, while private savings fall by less than the amount of the tax increase. So overall, then, the supply of loanable funds shifts to the right. This is illustrated in the diagrams below.

If the supply increases, we know that this is going to cause the real rate of interest to decrease. As the real rate of interest decreases both domestic investment (I) and Net Foreign Investment (NFI) are going to increase. The increase in NFI means that there is an increase in supply in the foreign exchange market, causing the real exchange rate to depreciate (fall). As the real exchange rate depreciates, two things occur. Firstly, US goods look relatively more attractive to foreigners, and so our Exports will increase. Secondly, the increase in our real exchange rate implies that foreign goods are relatively more expensive to us now, so our Imports will decrease. Overall, then, Net Exports increase, by the amount of the NFI increase.

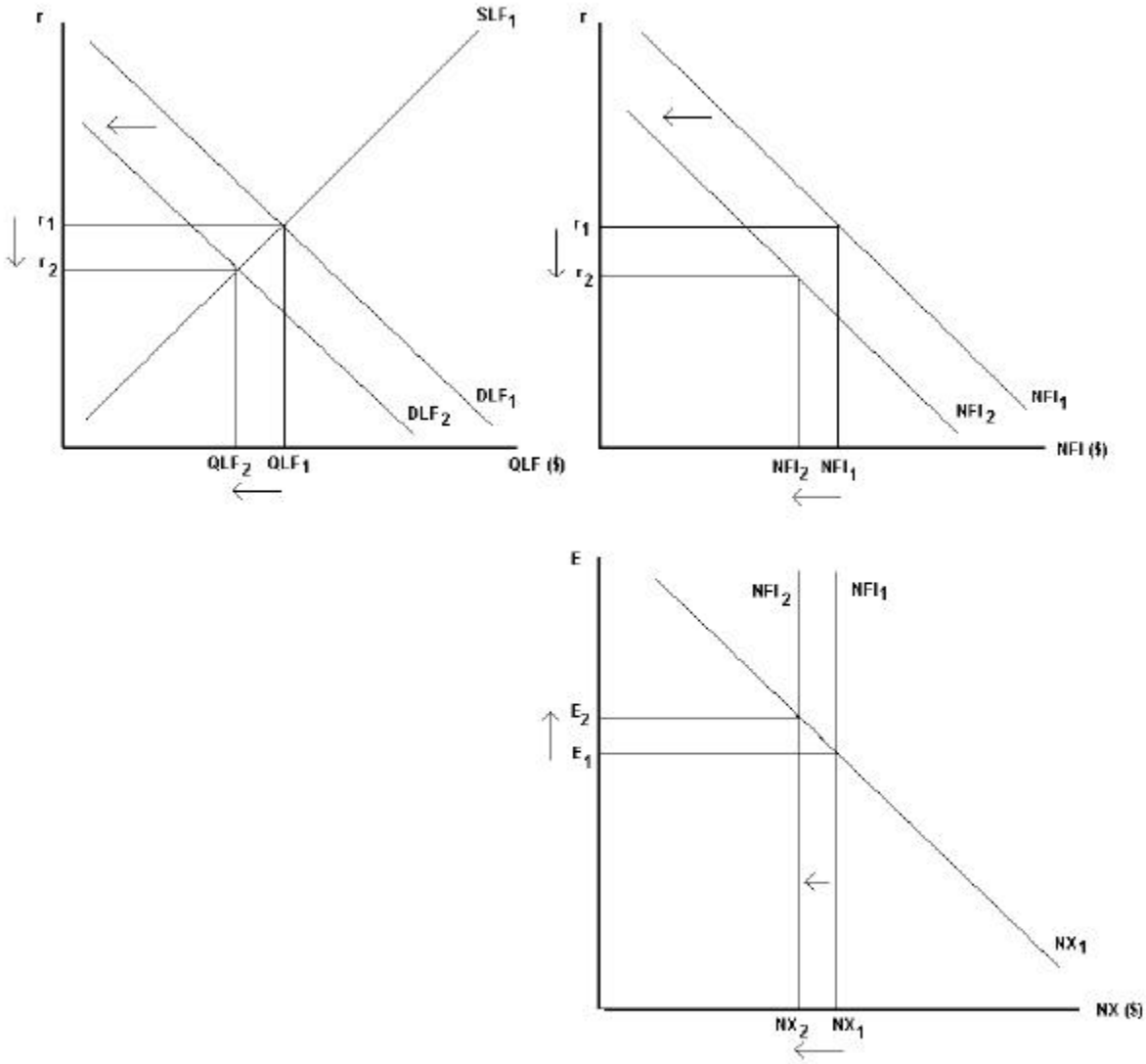


(b) Economic crises in Asian economies lead investors to move their capital to the US. (HINT: although it may look like NFI could end up larger here, it can't. The level of NFI must fall, it turns out, so be careful how you draw it.) (6 points)

The flow of capital into the US is a decrease in Net Foreign Investment (NFI). That is, an inward shift of the NFI curve. (Remember – NFI is the value of US foreign investment minus the value of investment by foreigners in the US.) We know that the demand for loanable funds (DLF) is comprised of both domestic investment (I) and NFI. So if NFI shifts inwards, then so must DLF, and by exactly the same horizontal distance as NFI shifts. This will cause a decrease in the real interest rate.

We know that as the real interest rate decrease this means that both I and NFI increase. However, it *cannot* be the case the NFI increases back above the level that we started at (convince yourself of this, both by drawing the diagram and by thinking about why). So overall NFI falls.

This fall in NFI implies a decrease in supply in the foreign exchange market. This puts upward pressure on the real exchange rate. As the real exchange rate increases, two things occur. First, US goods become relatively more expensive, so we will export less. Second, foreign goods become relatively cheap, so we will import more. Both of these things cause NX to decrease. These changes are illustrated in the diagrams below.



(c) Changes in tastes cause American consumers to buy more Japanese cars and fewer American cars. (4 points)

This is the relatively straightforward case. The change in tastes means that at every real exchange rate there is a decrease in Net Exports, as we import more cars from Japan. This does not mean, however, that in equilibrium, NX will increase: it won't. This is because there has been nothing to change NFI here. This is the supply curve in the foreign exchange market, and if supply does not change then there can be no change in quantity (NX) in equilibrium. All that happens in this case is that the real exchange rate falls. As the real exchange rate falls, there will be both an increase in exports and a decrease in imports, until NX have fallen back to the original level. Nothing affects the position of the NFI curve nor the market for loanable funds here, so there are no further changes. This is illustrated below.