Topic 6 – Open economy macroeconomics

1. (i) Fixed and floating exchange rate regimes form two extreme poles on a continuum of possibilities. In a pure floating regime, the Central Bank does not buy or sell any foreign currency. The Central Bank plays essentially the same role as in the closed economy, fixing the supply of high powered money in accordance with its desired monetary policy. The exchange rate is therefore determined entirely by the equilibration of private sector supply and demand. The convention is to define the exchange rate *e* as the price of foreign currency in terms of domestic currency. So, the exchange rate of the dollar against the pound (i.e. the U.K. is the domestic economy and the U.S. the foreign economy) is the price of a dollar in terms of pounds. So, an appreciation of the domestic currency is a decrease in *e*. The value of the pound will have increased relative to the dollar. A depreciation of the domestic currency is an increase in *e*; the value of the pound will have decreased relative to the dollar.

The demand and supply of foreign currency will be affected by a number of factors. Firstly, domestic currency will need to be exchanged for foreign currency in order to purchase imports from abroad, and profits from export sales will need to be turned from foreign currency into domestic currency in order to be repatriated. A second source of supply and demand will be generated from the trade in international assets. If domestic bonds become more attractive relative to foreign bonds, the demand for domestic currency and the supply of foreign currency will increase as people seek domestic currency in exchange for foreign currency in order to switch from foreign to domestic bonds. This will lead the private sector institutions which buy and sell currency to decrease the price of the dollar, i.e. to decrease *e*. The pound will therefore appreciate against the dollar. A third determinant of supply and demand is generated by the speculative motive for holding money. If speculators believe that the pound is likely to appreciate in the near future, they will buy pounds in order to sell them at a profit once the pound has appreciated. However, the increase in demand for pounds resulting from the beliefs of speculators can cause a self-fulfilling prophecy. The problem of currency speculation becomes much more serious when the Central Bank attempts to fix nominal exchange rates. This is because the discontinuity in the price adjustment means that currency crises build up until the Central Bank is forced to alter the exchange rate peg. However, even with floating exchange rates there is a great degree of variability in the nominal exchange rate which it is hard to explain only using changes in real interest rates or other real variables. This suggests that the speculative motive may also be important in the theoretical analysis of floating exchange rates.

In order to fix the price of any good without using rationing, an institution such as the government must be willing either to soak up the excess supply at the "artificially" high price or satisfy the excess demand at the "artificially" low price. The same applies to foreign currency. In a fixed exchange rate regime, the Central Bank must be willing to buy and sell any amount of foreign currency at the fixed price. This will mean that no private sector agency can sell foreign currency at a price greater than the fixed nominal exchange rate *e*, or buy it at a price less than the fixed nominal exchange rate *e*. This also implies that the Central Bank loses direct control over the domestic high-powered money supply; it must provide the amount of domestic currency demanded at the fixed exchange rate. This last statement is a slight simplification; even if the nominal exchange rate is fixed, there are still other policy tools which the Central Bank can attempt to use to affect the domestic high-powered money supply.

One possibility is sterilization. If the amount of high powered money is being increased or decreased due to the buying or selling of foreign currency at the fixed exchange rate by the Central Bank, the Central Bank could in principle sell or buy government debt bonds of equal value so that the total amount of high powered money in circulation remains the same. There are, however, a number of problems with this. Firstly, the Central Bank is only able to do this as long as it has bonds left to sell, so the Central Bank's control over the money supply is certainly no longer unlimited, as it is in the case of a floating exchange rate regime. Secondly, the effect that the sterilization has on further demand for domestic currency at the fixed exchange rate depends on the model we use for the equilibrium in world capital markets. In the Mundell-Fleming model, as we shall shortly see, sterilization is completely ineffective except in the very short run. In more realistic models, sterilization can have an effect, but the key point is that even with sterilization, the Central Bank is essentially limited by the international financial and monetary system in its control over the high powered money supply once it has committed to fixing the nominal exchange rate.

There were a number of attractions to a fixed exchange rate for many nations after WWII. The first was a reduction in uncertainty about exchange rate fluctuations, and thus hopefully an increase in international trade in goods and services. The second was inflation control; a traditionally high inflation nation could, by pegging its currency to a low inflation currency like the Deutschmark, provide a nominal anchor to keep inflation under control. However, the expansion of the international financial system, alongside increased international trade eventually made fixed exchange rates increasingly impractical. There were attempts in many European countries in the late 1970s and early 1980s to use capital controls to prevent speculative pressures, but by the time of the ERM crises in the early 1990s, it had become clear that the cost of achieving fixed exchange rates outweighed the benefits. This provided some of the impetus in Europe to irrevocably fixing exchange rates via a single currency, but the fluctuation bands of the ERM were greatly loosened in order to reduce the pain required in the intervening period during the 1990s.

One of the most serious problems with a fixed exchange rate occurs due to speculative pressures. When speculators believe that there is a change the Central Bank will alter the fixed exchange rate, they will start to buy or sell in currency in large quantities. If it is believed that the exchange rate will be revalued (i.e. that e will be decreased), this is not too much of a problem as people will want to hold domestic currency, and so they will sell foreign currency to the Central Bank in return for domestic currency at the fixed exchange rate. The Central Bank will see its foreign exchange reserves rise and the domestic high powered money supply increase. The problem emerges if a devaluation is expected in the near future. People holding domestic currency reserves will want to sell them in exchange for foreign currency before the deviation takes place, in order to avoid making a loss. This will result in a rapid depletion of the Central Bank's foreign currency reserves as it tries to hold the exchange rate fixed. The usual result in that sooner or later the Central Bank is forced to devalue. Here again we have the self-fulfilling prophecy. However, it can be argued that currency crises only emerge when there are underlying reasons in the real economy why a deviation is likely (e.g. a recession or trade deficit). We discuss this further later in regard to the UK and the ERM crisis.

(ii) The *balance of payments* is the sum of the *current account* and the *capital account*. The current account consists of the net trade in goods and services plus net transfer payments to domestic residents from abroad. If it is in surplus, the domestic economy is on average earning foreign currency. This foreign currency could either

be accumulated by the Central Bank or used to make investments abroad. The capital account measures the value of net domestic investment from abroad. So, if all of the current account surplus were invested abroad, the capital account would be equal to the negative value of the current account surplus. In any exchange rate regime, therefore, the following identity must hold:

$$CA+CU=\Delta R$$
$$BOP=\Delta R$$

(Where BOP is the balance of payments, CA is the capital account, CU is the current account and R is the Central Bank's foreign exchange reserves.)

In a pure floating exchange rate regime, the Central Bank does not buy or sell any reserves, and so $BOP=\Delta R=0$. In a fixed exchange rate regime, ΔR is determined by the requirement for keeping the nominal exchange rate fixed. In most countries which officially having a floating regime, however, it is rarely the case that $\Delta R=0$. Many countries therefore engage in what is often described as *dirty floating*; the Central Bank intervenes in a discretionary way to keep the floating exchange rate within desirable limits. The balance of payments therefore tends to fluctuate around the zero mark, provided the Central Bank is not deliberately building up foreign currency reserves (as many Asian central banks have been doing recently with the U.S. dollar).

2. The classic Mundell-Fleming model uses the assumption of perfect international capital mobility to draw some strong conclusions about the efficacy of monetary and fiscal policy in an open economy. Perfect international capital mobility implies (ignoring risk, or assuming risk neutral investors, so that there is no risk premium on different countries' bonds) that in equilibrium the real interest rate must be the same on government bonds in all countries. Another assumption is that the domestic economy is small relative to the world market so that the world interest rate is effectively fixed from a domestic point of view. Effectively, there is a third horizontal line in the IS-LM diagram at the world interest rate which represents the condition for equilibrium in the international bond market. The IS-LM equilibrium in the open economy must lie on this horizontal line. However, the manner in which the economy gets to this equilibrium depends on whether there is a floating or a fixed exchange rate.

The Mundell-Fleming model should be thought of as a short run model. This is because, like the standard IS-LM model, it ignores the supply side of the economy. It is slightly more general than the standard IS-LM model in that, since the domestic real interest rate is now fixed by the world real interest rate, it can be applied provided the domestic and foreign inflation rates are identical. Provided this condition holds, the nominal exchange rate can be treated as the real exchange rate in the function for net exports, because relative nominal prices do not change. However, it is clear that in reality, in the medium run changes in the domestic output level will alter the domestic inflation rate relative to the world inflation rate. This means that the simple Mundell-Fleming model is not adequate for an analysis of the medium run when the inflation rate is no longer fixed.

If there is a floating exchange rate regime, the adjustment to the short run equilibrium occurs through shifts in the IS curve. The LM curve is fixed because the Central Bank maintains control of the domestic money supply. If the domestic real interest rate falls below the world interest rate, there will be a massive capital outflow and therefore a depreciation of the domestic currency as investors switch to foreign bonds. This causes an outward shift in the IS curve, because it increases autonomous exports (autonomous in the sense of being independent of domestic income Y).

Similarly, if the domestic real interest rate rises above the world interest rate, there will be a massive capital inflow and an appreciation. This causes an inward shift in the IS curve. These shift will continue until the IS curve meets the LM curve at the world interest rate.

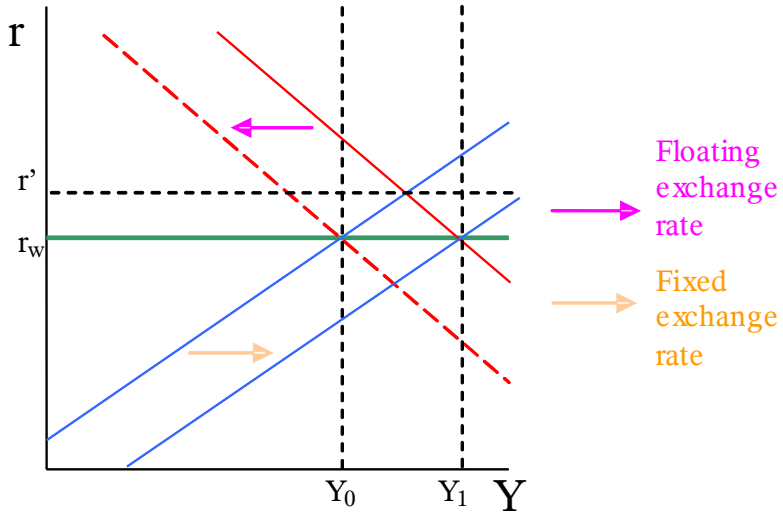
With fixed exchange rates, the adjustment to ensure international capital market equilibrium in the short run equilibrium occurs via shifts in the LM curve. This is because, assuming that domestic and foreign inflation rates are equal, the fixed nominal exchange rate leads to a fixed real exchange rate, a fixed level of autonomous exports, and therefore a fixed IS curve. In contrast, as we discussed earlier, the domestic money supply is now out of the control of the Central Bank because foreign currency must be bought and sold by the Central Bank at the fixed nominal exchange rate. Sterilization will not work due to the assumption that large capital inflows or outflows will continue until the domestic real interest rate is equalized with the world real interest rate. If the Central Bank were to use the sale of bonds to sterilize the expansion of the money supply brought about by a domestic interest rate higher than the world interest rate, the expansion of the money supply and the increase in foreign exchange reserves would continue until the Central Bank runs out of bonds to sell. At this point, the entire assets of the Central Bank would have been converted into foreign currency. However, it would then no longer be able to sterilize, and would be forced to allow the money supply to expand. The final result would be as if it had never attempted sterilization in the first place (so sterilization would at best prevent the money supply from expanding in the very short run, before the short run equilibrium in reached).

Suppose, on the other hand ,that the Central Bank were to buy bonds in order to sterilize the effect of a reduction in the domestic money supply (note that the domestic money supply includes holdings of domestic currency by foreigners) due to the domestic interest rate being below the world interest rate. This would eventually result in an exhaustion of the Central Bank's foreign currency reserves, at which point it would no longer be possible to keep the nominal exchange rate fixed. The entire assets of the Central Bank would have been converted into bonds. In reality, a devaluation would be forced long before this point is reached. Sterilization is therefore even less of an option here because it rapidly undermines the basis of a fixed exchange rate regime; a stock of foreign currency to cushion the Central Bank against shifts in demand for domestic and foreign currency. The Mundell-Fleming model therefore assumes that sterilization cannot be undertaken, and so the money supply expands or contracts until the LM curve meets the IS curve at the world real interest rate in the short run equilibrium.

A number of features of the simple perfect capital mobility Mundell-Fleming model are worth noting. Firstly, since in equilibrium the domestic real interest rate must be equal to the foreign interest rate, domestic real investment demand cannot be affected by either monetary and fiscal policy. This means that in an open economy with a floating exchange rate it is net exports which increase or decrease to equilibrate the goods and money markets. In other words, according to the simple Mundell-Fleming model, it is net exports which fluctuate around the trade cycle (although a more realistic model would of course have investment respond to fluctuation via changes in confidence). This is a major difference from the closed economy model, where investment bears the brunt of fluctuations in output. Secondly, the Mundell-Fleming model ignores the supply side of the economy; it does not deal with inflation. It is therefore, as previously argued, only appropriate under the assumption that foreign and domestic prices are fixed, or at least that the foreign and domestic inflation rates are fixed.

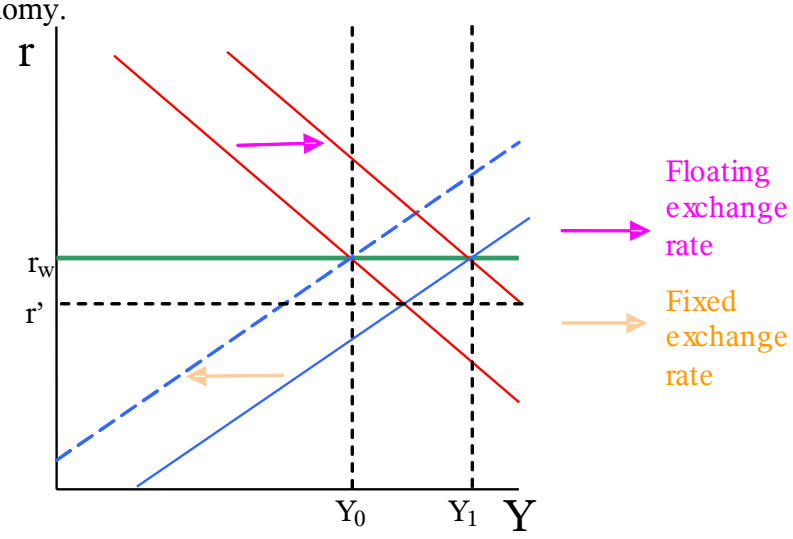
(i) Suppose that we are initially at IS-LM equilibrium at the fixed world interest rate r_w with output Y_0. A fiscal expansion then shifts the IS curve outwards. What happens next depends on whether we have a floating or a fixed exchange rate regime. With floating exchange rates, the increase in the domestic interest rate to r' causes an appreciation of the exchange rate which causes a decrease in autonomous export demand, shifting the IS curve back to the original position. The appreciation of the domestic currency means that domestic consumers are better off, because they are able to afford more foreign goods with their income. As a consequence, the current account will worsen because there will be lower export earnings and greater imports. This begs the question of how this current account deficit is financed. The answer in the context of this simple model is that the capital account automatically offsets any current account deficit. Perfect capital mobility means that infinitesimal difference in domestic and foreign interest rates can cause capital outflows or inflows to offset any current account deficit or surplus. The government deficit is reflected entirely in the current account deficit at the new equilibrium (this is assuming that consumption and investment do not respond to the exchange rate). Output is again Y_0 and the domestic interest rate r_w.

Suppose that there is a fixed exchange rate regime. The increase in the domestic interest rate above the world interest rate now causes an expansion in the money supply which shift the LM curve outwards until it meets the new IS curve at the world interest rate. This results in an increase in output from Y_0 to Y_1. The final resultant increase in output is equal to the increase in government expenditure multiplied by the Keynesian multiplier. So, fiscal policy is *more* effective in the short run under a fixed exchange rate than in a closed economy, because there is no crowding out of investment due to the automatic expansion of the money supply.

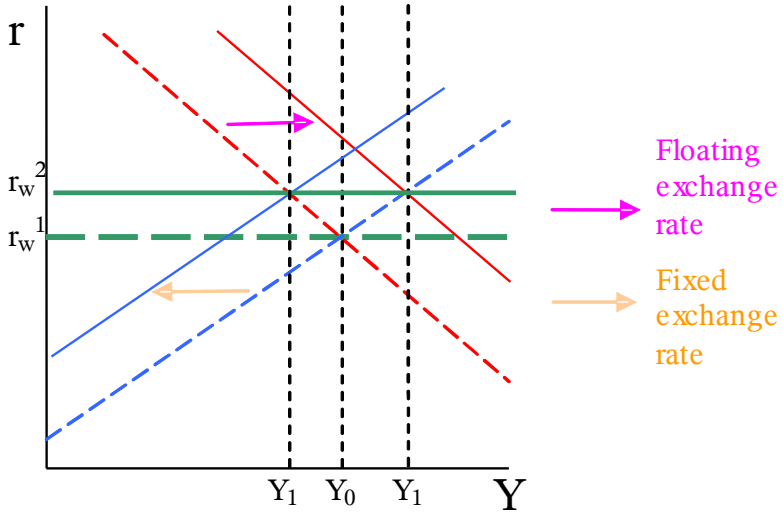


(ii) A monetary expansion under a fixed exchange rate regime will result in the domestic interest going below the world interest rate, and so in order to keep the exchange rate fixed, the Central Bank will be forced to sell foreign currency in exchange for domestic currency. This will cause a contraction in the money supply until, at the new short run equilibrium, the inward shift of the LM curve has brought the economy back to its original point (Y_0,r_w). If the initial monetary expansion was brought about buy buying bonds from the public in an open market operation, then the result of the monetary expansion will simply be that the Central Bank has run down its foreign exchange reserves by exactly the same amount as its bond holdings have increased.

In a floating rate regime, on the other hand, the dropping of the domestic interest rate below the world interest rate will cause a depreciation which will shift the IS curve outwards, so that the new short run equilibrium is at (Y_1,r_w). So, under floating exchange rates, a monetary expansion is even more effective that in the closed economy.



(iii) An increase in the world interest rate will, under a fixed exchange rate, cause a monetary contraction as people sell domestic currency to the central bank in return for foreign currency. The result will, in the short run, therefore, be a recession. In a floating exchange rate, on the other hand, the result of an increase in the world interest rate will be a depreciation of the currency and a short run economic boom. Note that even if recessions are more undesirable than inflationary booms, this analysis still does not count in favour of either type of regime because if the rise in world interest rates were instead a drop in real interest rates, the results from the two regimes would be reversed.



Since the Mundell-Fleming model only makes sense if the domestic and foreign inflation rates are equal, there is no need to distinguish between nominal and real exchange rates. Note also that since it is the real interest rate on the Y-axis, this simple model is able to deal with a positive rate of inflation provided there is no inflation differential between the domestic and foreign economies.

Which type of exchange rate regime is preferable depends on a number of factors:-

1) The ease with which fiscal policy can be used in macroeconomic demand management – Since monetary policy is essentially ineffective under fixed exchange rates, the standard criticisms against using fiscal policy as a short run policy tool count against fixed exchange rates. A floating rate regime is more likely to be able to stabilize the economy in the short run. One possible criticism is that a floating rate regime relies on net exports bearing the brunt of the short run adjustment process. This may prove highly damaging for the export sector of an open economy with a floating rate. However, once we have a more realistic model of the economy with imperfect capital mobility, consumption and investment will also respond to interest rate changes.
2) The degree of openness of the economy – There is more to gain in terms of efficiency of international trade if the economy is more open. Also, the more open is the economy, the more rapidly will any competitiveness gain from depreciation/devaluation be eliminated by inflation, because a depreciation will cause such a large drop in real wages that inflationary pressures will quickly accelerate. So, a very open economy is generally better off with a fixed exchange rate with its main trading partners, ceteris paribus – a monetary union probably being the best option.
3) The degree to which irrational speculation occurs – If speculation is indeed irrational from the point of view of economic efficiency and purely leads to bubbles and self-fulfilling prophecies then this is a problem both for fixed and floating exchange rates. However, it probably counts more severely against fixed exchange rates because it results in highly expensive and damaging currency crises even when economies are fundamentally sound, whereas in the case of floating exchange rates it simply results in an undesirably large variability of the exchange rate. However, if exchange rates are irrevocably fixed in a monetary union, this completely solves the problem because then speculation cannot occur at all. If irrational speculation is not a problem, on the other hand, the increased short run flexibility of an economy with floating exchange rates arguably gives a floating exchange rate the upper hand. Empirical evidence suggests that irrational speculation is a problem, so overall this point counts in favour of monetary union.

The conclusion would seem to be that the essential choice is between either a dirty floating regime or a monetary union; fixed exchange rates simply create too many damaging speculative pressures whereas dirty floating has all the flexibility advantages of clean floating plus giving the Central Bank some latitude in order to reduce exchange rate instability. However, the decision between these two is rather subtle. Generally speaking, the greater a proportion of a country's output that is traded abroad, the greater benefits there are from having a single currency with its main trading partners, due to the greater price transparency for efficient international trade and the issues surrounding inflation and wage adjustment to competitiveness changes. Also, the greater the flexibility of a country's labour market, the more quickly prices can adjust during a recession to return the economy back to equilibrium output, and so the less need there is for aggregate demand policy. Thirdly, the more quickly and effectively fiscal policy can be used to stabilize the economy (either through large automatic stabilizers or rapid and accurate discretionary fiscal policy) the less cost there is to having fixed exchange rates. Taking the U.S. as an example, it is fairly closed (about 9% of G.D.P. is traded), has a cumbersome fiscal policy making mechanism and trades with a wide variety of different countries. It is therefore undoubtedly better off with a floating exchange rate with the rest of the world. Take Belgium on the other hand. About 85% of its G.D.P. is traded and more than 70% of this is with its E.U. neighbours. There can be little doubt that Belgium is better off

adopting the European single currency (although whether it is the best thing for larger countries like Germany or France is more debatable). The UK lies somewhere in between these extremes (just under 30% of GDP is traded with about 50%-60% of this with other E.U. countries), and so there is a legitimate debate over entry (which includes political considerations as well as economic ones, of course).

3. The Mundell-Fleming model suggests that a monetary expansion in a floating exchange rate regime will cause a depreciation of the domestic currency which will then stimulate domestic aggregate demand in the short run. In a fixed exchange rate regime, a similar result could be achieved by devaluation. In a country with its own currency were to join a currency union, it would no longer have either of these options open to it. One can question whether this is important. In the medium run, the economy must have stable inflation. Supposing the economy started off at full employment so that Y_0 in the examples above was equilibrium output. A monetary expansion or devaluation would clearly result in higher inflation in the medium run, until the price level domestically had risen so as to offset the depreciation of the nominal exchange rate so that the real exchange rate was back where it originally started. Only then could domestic inflation once again be stable (and it would have to have returned to the world inflation rate if the nominal exchange rate is once again unchanging, although this would depend on domestic monetary policy, i.e. upon the domestic inflation target being the same as the world inflation rate). The output gain from the devaluation/depreciation therefore only occurs in the short run. This would suggest that joining a currency union would not require giving up much latitude.

Suppose, however, that the economy is initially in recession below the equilibrium output level. In the economy were in a currency union, it would have to wait for domestic nominal prices and wages to drop in order to restore competitiveness and get the economy back to its original output level. On the other hand, if the economy were able to devalue or expand its own money supply and cause a depreciation, it would be able to get back to the original equilibrium immediately. In this case, if there is nominal wage rigidity in the economy, devaluation could work as a way of getting the economy out of a recession. Clearly, the degree to which this is a serious issue depends on the time it takes to get from the short to the medium run, which in turn depends on the degree of nominal wage flexibility in the economy.

There is another potential problem with using depreciation or devaluation as a macroeconomic demand management tool. This is the fact that whilst devaluation/depreciation increases domestic demand, it does so at the expense of demand in foreign economies. If all countries are in recession and attempt to use monetary expansion or devaluation to stimulate demand than this would result in a worldwide monetary expansion, which would have a desirable effect. The problem emerges if countries are worried about their current account deficit. For example, the U.S. currently has a current account deficit whilst the Euro area is running a surplus. Suppose the U.S. wants to close the deficit whilst keeping output at its current level. The Mundell-Fleming model suggests that by tightening fiscal policy (i.e. reducing government expenditure), it will induce a depreciation which will expand net exports to “fill in the gap”. This would improve the U.S. current account deficit. However, suppose that the Euro area does not want its current account surplus to be reduced. It may follow suit by cutting its government expenditure. In the Mundell-Fleming model, since the world interest rate is fixed, the result will be a recession on both sides of the Atlantic and no improvement in the U.S. current account. This is an example of depreciation operating as a “beggar thy neighbour” policy. A similar result would occur if there was a fixed exchange rate and the U.S. combined a devaluation with fiscal consolidation. If the Euro area tried to prevent its current

account surplus from being reduced, the result would be a recession. It should be pointed out, however, that these potential conflicts are not as serious as may seem at first, because a country whose currency appreciates becomes better off because foreign imports become cheaper. A country running a persistent current account surplus is basically failing to enjoy the wealth it has accumulated, so it shouldn't really have too much of a problem if another country wants to devalue against it, which is essentially the way it will pay back what it owes to the first country.

The existence of the Euro area as opposed previously to an assortment of currencies over the English channel probably does reduce the flexibility benefits that having a floating exchange rate gives to the UK. because the U.K. will probably find it more difficult to control the value of its currency against such a large block. The U.K. also has fairly flexible labour markets. Just under 30% of U.K. G.D.P. is traded, and between 50%-60% of this is with the other E.U. countries. So, the U.K. lies somewhere between the examples of the U.S. and Belgium. There are potentially large gains to be made from greater currency stability. However, being able to devalue against the Euro could still be a useful short run demand management tool, and joining the Euro area would reduce the U.K.'s exchange rate flexibility relative to the other 40% of its trade which is outside the Euro area. The UK has also historically experienced quite large and arguably damaging swings in its exchange rate, for example in the early 1980s when the overvaluation of the pound helped to decimate British manufacturing industries.

However, powerful ammunition for the argument against joining is that the E.R.M. debacle in the early 1990s demonstrates that fixing the exchange rate irrevocably could be disastrous. Although it was speculative pressures which forced the devaluation of the pound in 1992, the underlying reason for the crisis was the recession, and the belief that the government would not be able sustain a policy of keeping high unemployment as the cost of a fixed exchange rate. Essentially, German interest rates after reunification were too high for the U.K. The reverse situation exists today. The U.K. economy is currently booming whilst a large part of the rest of the E.U. is stagnant. Euro area interest rates are well below those in the U.K. If the U.K. were to join now, the result would probably be a period of inflation followed by a collapse in consumer demand as it is realized that the boom is not sustainable. A period of high unemployment would then be required to restore competitiveness. This is the primary reason why the current government has demanded that 5 "economic convergence tests" be fulfilled. Another point worth making is that if the U.K. had joined, then Euro area interest rates would have needed to be higher to accommodate the U.K. This would have meant that Germany would have suffered even more because its economy needed low interest rates in order to avoid deflation.