The costs of a common currency

Introduction

The costs of a monetary union derive from the fact that when a country relinquishes its national currency, it also relinquishes an instrument of economic policy, i.e. it loses the ability to conduct a national monetary policy. In other words, in a full monetary union the national central bank either ceases to exist or will have no real power. This implies that a nation joining a monetary union will no longer be able to change the price of its currency (by devaluations and revaluations), to determine the quantity of the national money in circulation, or to change the short-term interest rate.

One may raise the issue here of what good it does for a nation to be able to conduct an independent monetary policy (including changing the price of its currency). There are many situations in which these policies can be very useful for an individual nation. The exchange rate is useful as a policy instrument, for example, because nations are different in some important senses, requiring changes in the exchange rate to occur. In Section 1.1 we analyse some of the differences that may require exchange rate adjustments. In later sections we analyse how the loss of monetary independence may be costly in some other ways for an individual nation, in particular in the way government budget deficits can be financed.

The analysis that follows in this chapter is known as the 'theory of optimum currency areas'. This theory, which was pioneered by Mundell (1961), McKinnon (1963), and Kenen (1969), has concentrated on the cost side of the cost–benefit analysis of a monetary union.[1]

1.1 Shifts in demand (Mundell)

Consider the case of a demand shift developed by Mundell (1961) in his celebrated article on optimum currency areas. Let us suppose first that two countries, which we call France and Germany, form a monetary union. By that we mean that they have abandoned their national currencies and use a common currency, the euro, which is managed by a common central bank, the European Central Bank (ECB). Let us assume further that for some reason

[1] For surveys of this literature, see Ishiyama (1975); Tower and Willett (1976); and Mongelli (2002).

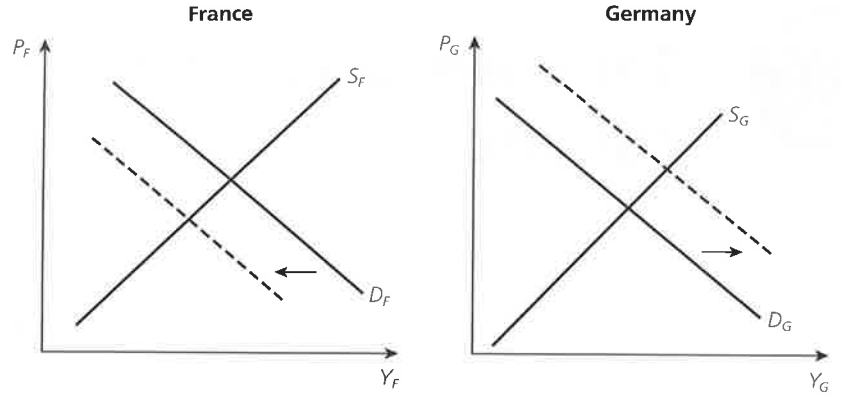

Figure 1.1 Aggregate demand and supply in France and Germany.

consumers shift their preferences away from French-made to German-made products. We present the effects of this asymmetric shock in aggregate demand in Fig. 1.1.

The curves in Fig. 1.1 are the standard aggregate demand and supply curves in an open economy seen in most macroeconomics textbooks.[2] The demand curve is the negatively sloped line indicating that when the domestic price level increases the demand for the domestic output declines.[3]

The supply curve expresses the idea that when the price of the domestic output increases, domestic firms, in a competitive environment, will increase their supply in order to profit from the higher price. In addition, each supply curve is drawn under the assumption that the nominal wage rate and the prices of other inputs (e.g. energy, imported inputs) remain constant. Changes in the prices of these inputs will shift these supply curves.

The demand shift is represented by an upward movement of the demand curve in Germany, and a downward movement in France. As will be discussed later, it will be important to know whether these demand shifts are permanent or temporary. For the moment we assume that these shifts are permanent, e.g. due to a change in consumer preferences. The result of these demand shifts, then, is that output declines in France and increases in Germany. This is most likely to lead to additional unemployment in France and a decline in unemployment in Germany.

Both countries will have an adjustment problem. France is plagued with reduced output and higher unemployment. Germany experiences a boom, which also leads to upward pressures on its price level. The question that arises is whether there is a mechanism that leads to automatic equilibration.

The answer is positive. There are two mechanisms that will automatically bring back equilibrium in the two countries. One is based on wage flexibility, the other on the mobility of labour.

1. *Wage flexibility*. If wages in France and Germany are flexible the following will happen. French workers who are unemployed will reduce their wage claims. In Germany, the excess

[2] See Krugman and Wells (2005); Mankiw (2006); or Blanchard (2008).

[3] This is the substitution effect of a price increase. In the standard aggregate demand analysis, there is also a monetary effect: when the domestic price level increases, the stock of real cash balances declines, leading to an upward movement in the domestic real interest rate. This in turn reduces aggregate demand (see De Grauwe (1983)). Here we disregard the monetary effect and concentrate on the substitution effect.

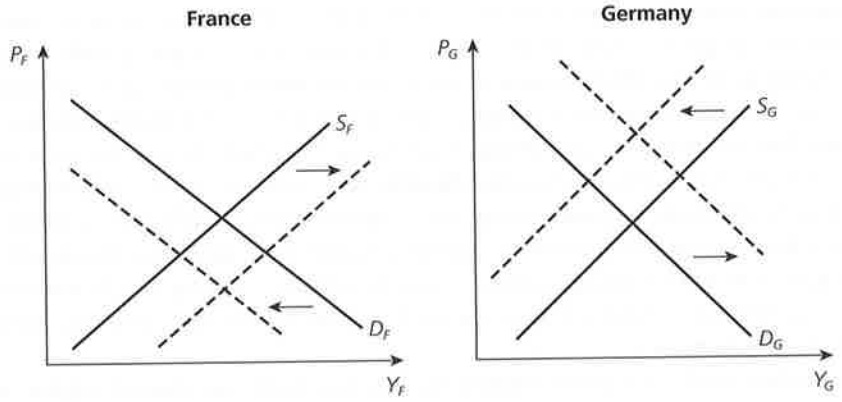

Figure 1.2 The automatic adjustment process.

demand for labour will push up the wage rate. The effect of this adjustment mechanism is shown in Fig. 1.2. The reduction of the wage rate in France shifts the aggregate supply curve downwards, whereas the wage increases in Germany shift the aggregate supply curve upwards. These shifts lead to a new equilibrium. In France, the price of output declines, making French products more competitive, and stimulating demand. The opposite occurs in Germany.

Note also that the second-order effects on aggregate demand will reinforce the equilibrating mechanism. The wage and price increases in Germany make French products more competitive. This leads to an upward shift in the French aggregate demand curve. Similarly, the decline in French costs and prices makes German products less competitive and shifts the German aggregate demand curve downwards.

2. *Mobility of labour.* A second mechanism that will lead to a new equilibrium involves mobility of labour. The French unemployed workers move to Germany where there is excess demand for labour. This movement of labour eliminates the need to let wages decline in France and increase in Germany. Thus, the French unemployment problem disappears, whereas the inflationary wage pressures in Germany vanish.

Thus, in principle the adjustment problem for France and Germany will disappear automatically if wages are flexible, and/or if the mobility of labour between the two countries is sufficiently high. If these conditions are not satisfied, however, the adjustment problem will not vanish. Suppose, for example, that wages in France do not decline despite the unemployment situation, and that French workers do not move to Germany. In that case France is stuck in the disequilibrium situation depicted in Fig. 1.1. In Germany, the excess demand for labour puts upward pressure on the wage rate, producing an upward shift of the supply curve. The adjustment to the disequilibrium must now come exclusively through price increases in Germany. These German price increases make French goods more competitive again, leading to an upward shift in the aggregate demand curve in France. Thus, if wages do not decline in France the adjustment to the disequilibrium will take the form of inflation in Germany.

What would have happened if the two countries had not been in a monetary union? In that case they would have been free to use their national monetary policy tools to adjust to the asymmetric shocks. There are several ways in which countries that maintain their monetary independence can use their monetary policy instruments. We distinguish two methods here that are related to the exchange rate regime that countries use. In a first regime, these countries keep their exchange rates flexible, very much as the US, the UK, and Japan are doing. In that case, they can change their monetary policies (through changes in the domestic interest rate and/or the money supply) to achieve a particular objective. In a second regime, countries peg their exchange rates to another currency, e.g. Denmark to the euro, or several Latin American countries to the dollar. In this case they can devalue or revalue their currencies.

Suppose first that France and Germany had chosen a flexible exchange rate regime. In that case, France could have lowered its interest rate, thereby stimulating aggregate demand, while Germany could have raised its interest rate, thereby reducing aggregate demand. These monetary policies conducted by France and Germany would likely have led to a depreciation of the French franc and an appreciation of the German mark, thereby making the French products sold in Germany cheaper. Both the interest rate and exchange rate changes would have tended to boost aggregate demand in France and to lower aggregate demand in Germany.

If France and Germany had chosen to peg their exchange rate, France would have been able to devalue the franc against the mark, thereby achieving similar effects on aggregate demand. The devaluation of the franc would have increased the competitiveness of the French products, thereby stimulating the demand coming from Germany.

The effects of these national monetary policies are shown in Fig. 1.3. The expansionary monetary policy in France (or in the second regime, the devaluation of the French franc) shifts the French aggregate demand curve upwards. In Germany, the opposite occurs. The restrictive monetary policy in Germany (the appreciation of the mark) reduces aggregate demand in Germany, so that the demand curve shifts back to the left.

The effects of these demand shifts are that France solves its unemployment problem and Germany avoids having to accept inflationary pressures. This remarkable feat is achieved using just one instrument. (The reader may sense that this is too good to be true. And indeed

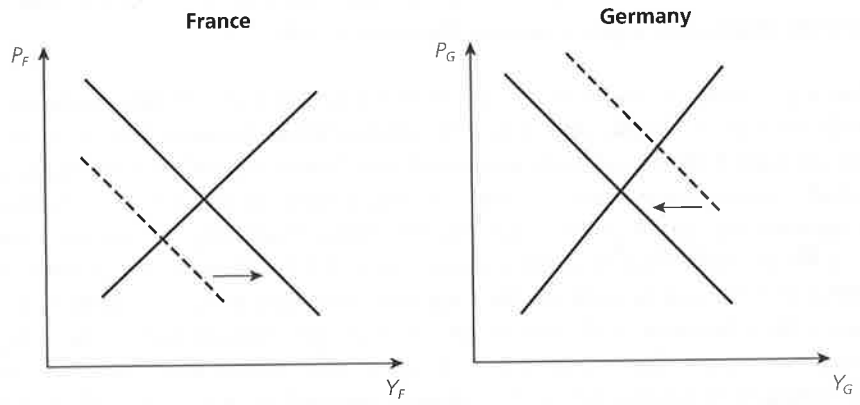

Figure 1.3 Effects of monetary expansion in France and monetary restriction in Germany.

it is. However, for the moment we just present Mundell's theory. We come back with criticism in Chapter 2.)

In contrast, when France is part of a monetary union with Germany it relinquishes control over its monetary policy. If it is saddled with a sustained unemployment problem, that can only disappear as a result of deflation (a price decline) in France. In this sense, we can say that a monetary union has a cost for France when it is faced with a negative demand shock. Similarly, Germany will find it costly to be in a monetary union with France, because it will have to accept more inflation than it would like.

Let us recapitulate the main points developed in this section. If wages are rigid and if labour mobility is limited, countries that form a monetary union will find it harder to adjust to asymmetric demand shifts than countries that have maintained their own national money and that can devalue (revalue) their currency. (In Box 1.1, we analyse whether this

BOX 1.1 Symmetric and asymmetric shocks compared

We have seen that the occurrence of asymmetric shocks creates costs of adjustment in a monetary union if there is a lack of flexibility in the labour markets. Things are very different when symmetric shocks occur. We illustrate this using the same two-country model of aggregate demand and supply as in Fig. 1.1. We now assume that the demand shocks are symmetric. More specifically, we assume that in both France and Germany the demand curve shifts to the left in equal amounts. The result is shown in Fig. 1.4.

Can France and Germany deal with this negative demand shock when they are in a monetary union? The answer is yes, at least in principle. In a monetary union, monetary policy is centralized in the hands of the union central bank. Call it the European Central Bank (ECB). In addition, in a monetary union there is only one interest rate as the money markets are perfectly integrated. The ECB can now lower the interest rate, thereby stimulating aggregate demand in both countries. This contrasts markedly with the case of asymmetric shocks. There the ECB will be pretty much paralysed, because it has only one instrument to deal with two problems. If it reduces the interest rate so as to stimulate aggregate demand in France, it increases inflationary pressure in Germany. If, on the other hand, it increases the interest rate so as to deal with the inflationary pressure in Germany, it reduces aggregate demand in France, and intensifies that country's problem.

It is also interesting to analyse what would happen if the two countries that face a symmetric shock were not in a monetary union. Would devaluation then be an attractive policy option? The answer is no. Suppose that France were to devalue. This would stimulate aggregate demand in France, at the expense of Germany. In France, the aggregate demand curve would shift to the right. The French devaluation would, however, shift the German aggregate demand curve further to the left. The French would essentially solve their problem by exporting it to Germany. It is likely that the latter would react. The danger of a spiral of devaluations and counter-devaluations would be real. In the end the effectiveness of changing the exchange rate would be greatly reduced. In order to avoid such a spiral the two countries would have to coordinate their actions, which is difficult among independent nations. In a monetary union, by contrast, this monetary cooperation is institutionalized. We conclude that a monetary union is a more attractive monetary regime than a regime of independent monetary authorities if shocks that hit the countries are symmetric. When shocks are asymmetric, however, this advantage of a monetary union disappears.

It should be noted that we have assumed that the ECB can manipulate aggregate demand in the union. There are reasons to believe that the effectiveness of monetary policy in raising aggregate demand is limited. The same criticism, however, applies as far as the effectiveness of devaluations is concerned. When countries are independent and they use the exchange rate as an instrument to deal with asymmetric shocks, they face similar limitations on the effectiveness of exchange rate policies. We return to these issues in Chapter 2.

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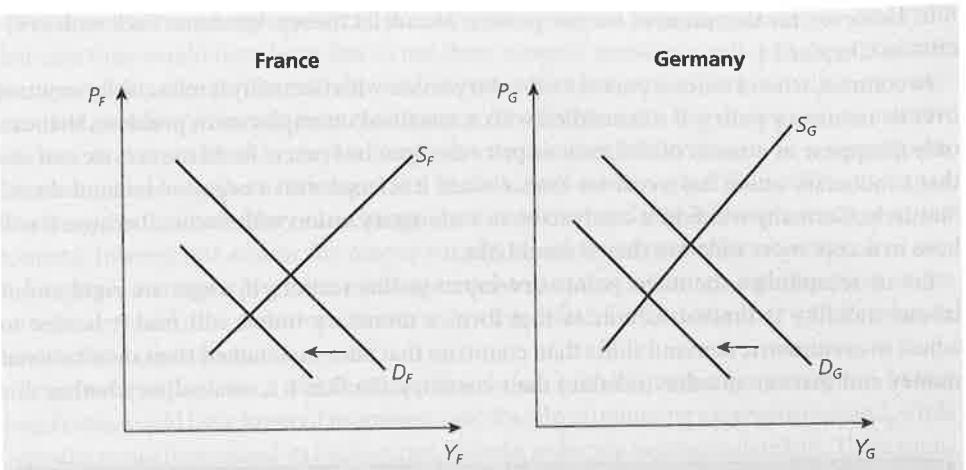

Figure 1.4 Symmetric shocks.

conclusion holds when demand shocks are symmetric.) In the case of countries that have kept their own money, national monetary policies, including the exchange rate, add some flexibility to a system that is overly rigid. Put differently, a monetary union between two or more countries is optimal if one of the following conditions is satisfied: (*a*) there is sufficient wage flexibility; (*b*) there is sufficient mobility of labour.

1.2 Monetary independence and government budgets

When countries join a monetary union they lose their monetary independence. As argued in Section 1.1, that affects their capacity to deal with asymmetric shocks. This is the essence of the traditional theory of optimal currency areas as developed by Mundell (1961). This theory, however, is incomplete. It overlooks another major implication of the loss of monetary independence: the entry into a monetary union fundamentally changes the capacity of governments to finance their budget deficits. This is important, but surprisingly it was overlooked until the sovereign debt crisis in the Eurozone emerged in 2010. Let us develop this point further.[4]

Members of a monetary union issue debt in a currency over which they have no control. For example, when France, Germany, and Spain entered the Eurozone they ceased to issue their debt in their national currencies (the French franc, the German mark, and the Spanish peseta) over which they had full control. Instead, they now issue their debt in euros, a currency that none of these governments control. This has a profound implication. It implies that these governments cannot give an ironclad guarantee to the holders of government bonds that they will have enough cash to pay them (the bondholders) out when the bonds come to maturity. This contrasts with a standalone country like the UK. The UK government

[4] The following sections are based on De Grauwe (2011).

can give a full guarantee to holders of UK government bonds that they will be paid out when the bonds mature. The reason is that there is a central bank, the Bank of England, that will be ready (or be forced) to provide liquidity to the UK government if the latter were to face a liquidity shortage, which would prevent it from paying out bondholders. Governments of member countries of a monetary union have no central bank that can be forced to provide liquidity in times of crisis.

As will be shown in the next paragraphs, the fact that governments of a monetary union cannot give a guarantee to the holders of the government bonds that they will always be paid out at maturity, implies that financial markets acquire the power to force default on these countries. This is not the case in countries that are not part of a monetary union, and that have kept control over the currency in which they issue debt. These countries cannot easily be forced into default by financial markets.

In order to show why this is so, we analyse in detail what happens when investors start having doubts about the solvency of these two types of countries. We will use the UK as a prototype monetary 'stand-alone' country and Spain as a prototype member country of a monetary union.[5]

The UK scenario

Let's first trace what would happen if investors were to fear that the UK government might be defaulting on its debt. In that case, they would sell their UK government bonds, driving up the interest rate. After selling these bonds, these investors would have pounds that most probably they would want to get rid of by selling them in the foreign exchange market. The price of the pound would drop until somebody else was willing to buy these pounds. The effect of this mechanism is that the pounds would remain bottled up in the UK money market to be invested in UK assets. Put differently, the UK money stock would remain unchanged. Part of that stock of money would probably be re-invested in UK government securities. But even if that were not the case so that the UK government could not find the funds to roll over its debt at reasonable interest rates, it would certainly force the Bank of England to provide it with the cash to pay out bondholders. Thus the UK government is ensured that the liquidity is around to fund its debt. This means that investors cannot precipitate a liquidity crisis in the UK that could force the UK government into default. There is a superior force of last resort, the Bank of England.

The Spanish scenario

Things are dramatically different for a member of a monetary union such as Spain. Suppose investors fear a default by the Spanish government. As a result, they sell Spanish government bonds, raising the interest rate. So far, we have the same effects as in the case of the UK. The rest is very different. The investors who have acquired euros are likely to decide to invest these euros elsewhere, say in German government bonds. As a result, the euros leave the Spanish banking system. There is no foreign exchange market and flexible exchange rate

[5] See Kopf (2011) for an insightful analysis and Winkler (2011) for an interesting comparison with the US banking system of the nineteenth century.

to stop this. Thus, the total amount of liquidity (money supply) in Spain shrinks. The Spanish government experiences a liquidity crisis, i.e. it cannot obtain funds to roll over its debt at reasonable interest rates. In addition, the Spanish government cannot force the Bank of Spain to provide the cash. The common central bank (the ECB in the Eurozone) can provide all the liquidity in the world, but the Spanish government does not control that institution. The liquidity crisis, if strong enough, can force the Spanish government into default because it cannot find the cash to pay out the bondholders. Financial markets know this and will test the Spanish government when budget deficits deteriorate. Thus, in a monetary union, financial markets acquire tremendous power and can force any member country onto its knees.

The situation of Spain is reminiscent of the situation of emerging economies that have to borrow in a foreign currency. These emerging economies face the same problem, i.e. they can be confronted with a 'sudden stop' when capital inflows suddenly stop, leading to a liquidity crisis (see Calvo 1988 and Eichengreen et al. 2005).

The previous analysis stresses the fragility of a monetary union. When investors distrust a particular member government they will sell the bonds, thereby raising the interest rate and triggering a *liquidity* crisis. This may in turn set in motion a *solvency* problem, i.e. with a higher interest rate the government debt burden increases, forcing the government to reduce spending and increase taxation. Such forced budgetary austerity is politically costly, and in turn may lead the government to stop servicing the debt, and to declare a default. Thus, by entering a monetary union, member countries become vulnerable to movements of distrust by investors. Note that there is a self-fulfilling prophecy in these dynamics. When financial markets start distrusting a particular government's ability (or willingness) to service its debt, investors sell the government bonds, making it more likely that the government will stop servicing the debt. We come back to this feature of government debt crises in Chapter 5.

Note also that these dynamics are absent in countries that have kept their monetary independence. The reason is that these 'stand-alone' countries issue their debt in their own currencies. These countries, therefore, can always create the liquidity to pay out the bondholders. This does not mean, of course, that these countries may not have problems of their own. One could be that the too-easy capacity to finance debt by money creation leads to inflation. But it remains true that these countries cannot be forced against their will into default by financial markets. The fact that this is possible in a monetary union makes such a union fragile and costly.

There is an important interaction between the fragility of a monetary union and asymmetric shocks. We discuss this interaction in Section 1.3.

1.3 Asymmetric shocks and debt dynamics

Let us return to the two-country model presented in Section 1.1. We discussed the adjustment problem France and Germany face in a monetary union when they are hit by an asymmetric demand shock. How is this adjustment affected when we take into account the budgetary implications? Let us first concentrate on France. As a result of the negative demand shock, output and employment decline in France. The effects on the French government budget are the following. First, the decline of French GDP leads to a decline of government tax receipts. This decline is probably more than proportional to the decline in GDP because income taxes

are progressive. Second, because unemployment increases, the French government expenditures increase. When adding up these two effects we conclude that the French government budget deficit increases. This increase follows automatically from the decline in GDP. It is inherent in the government budget.

If the decline in aggregate demand is strong enough, the ensuing automatic increase in the French government budget deficit can become so large that investors start having doubts about the solvency of the French government. Let us go through the scenario that we developed for Spain in Section 1.2 and apply it to France. Distrust in the French government will lead investors to sell French government bonds, leading in turn to an increase in the interest rate and a liquidity crisis. The macroeconomic implications of this crisis are that the aggregate demand curve in France shifts further to the left, i.e. with a higher interest rate in France, French residents will spend less on consumption and investment goods. We show this effect in Fig. 1.5. The asymmetric demand shock shifts the demand curve from D_F to D'_F. This was the effect analysed in Fig. 1.1. The debt crisis now adds to the negative demand shock by further shifting the demand curve to D''_F. Thus, the debt crisis amplifies the initial negative demand shock.

What is the effect of the French government debt crisis on Germany? In order to analyse this we go back to the moment that investors sell French government bonds. After these sales, investors acquire cash (call them euros) that they will want to invest. Presumably since they were holding (French) government bonds they will want to acquire other government bonds that they trust. In the present circumstances, these are likely to be German government bonds. So, let us assume that these investors buy German government bonds. The effect of these purchases is that the price of German government bonds increases. This in turn reduces the yield on these bonds. The effect of this liquidity flow (out of French bonds into German bonds) is that the interest rate in Germany declines. This will then in turn increase aggregate demand in Germany. We show this effect in Fig. 1.5. The initial positive demand shock is now reinforced by an additional shift in the demand curve.

We conclude from this analysis that the debt crisis in France leads to an amplification of the asymmetric demand shock, amplifying the negative effects in France and amplifying the positive effects in Germany. This amplification effect occurs because the interest rate increases in France and declines in Germany. Thus, these interest rate changes, instead of

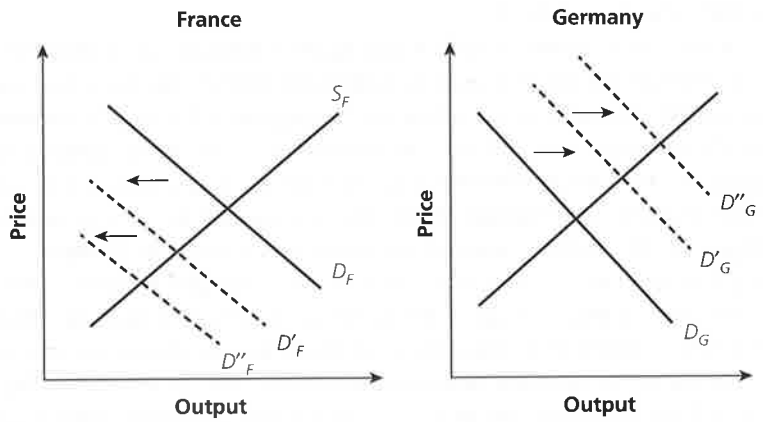

Figure 1.5 Amplification of asymmetric shocks.

stabilizing the system, tend to destabilize it. All this intensifies the adjustment problems of both countries.

The reader may be surprised that in this monetary union between France and Germany, interest rates can diverge. Isn't it a characteristic of a monetary union that the interest rates are the same everywhere? The answer is that this is the case for the short-term interest rate that is under the control of the common central bank. The long-term interest rates, however, can diverge. These are the interest rates on long-term government bonds. The latter will diverge if the investors attach different risks of holding the different government bonds. Thus, in the example of France and Germany developed here, investors perceive a higher risk of default on French government bonds than on German government bonds and will therefore want a higher interest rate (yield) on French bonds. Note also that it is the long-term interest rate that affects aggregate demand.

1.4 Booms and busts in a monetary union

The asymmetric shock discussed in the previous paragraphs is an exogenous event with permanent effects, produced by a change in consumer preferences. Many asymmetric shocks, however, are of a different nature.

Capitalism is a wonderful human invention that manages to steer individual initiative and creativity towards capital accumulation and ever more material progress. It is also inherently unstable, however. Periods of optimism and pessimism alternate, creating booms and busts in economic activity. The booms are wonderful; the busts create great hardship for many people.

Booms and busts are endemic in capitalism because many economic decisions are forward-looking. Investors and consumers look into the future to decide to invest or to consume. But the future is dark. Nobody knows it. As a result, when making forecasts, consumers and investors look at each other. This makes it possible for the optimism of one individual to be transmitted to others, creating a self-fulfilling movement in optimism. Optimism induces consumers to consume more and investors to invest more, thereby validating their optimism. The reverse is also true. When pessimism sets in, the same herding mechanism leads to a self-fulfilling decline in economic activity. Animal spirits prevail (Keynes 1936, Akerlof and Shiller 2009, De Grauwe 2012).

As long as these movements in animal spirits are synchronized between the member states of the monetary union, they pose no additional problem for the union, i.e. the fact that these countries are in a monetary union does not aggravate the booms and busts. Things are different if these movements are not synchronized, i.e. when some countries experience booms and others an economic downturn. Let us analyse the case of desynchronized business cycle movements in a monetary union. We now assume that the asymmetric shock shown in Fig. 1.1 is the result of a recession in France and a boom in Germany.

We distinguish two possible scenarios. The first one is benign; the second one is not. In the benign scenario the union can live with the desynchronized business cycle. Why is this?

First we note that since this is a business cycle shock, it is temporary, i.e. after some time France will experience a boom and Germany a recession. There is no need for France to try to adjust through wage and price declines, or Germany through wage and price increases, or through emigration of French workers to Germany.

Second, the automatic stabilizers in the budget can be used to do their job of stabilizing the business cycle. In France, the recession leads to a budget deficit; in Germany, the boom leads to a budget surplus. This mechanism will tend to reduce the intensity of the recession in France, because by running a budget deficit the French government injects purchasing power in the economy. It also reduces the intensity of the boom in Germany because the budget surpluses reduce purchasing power in that country.

This scenario, however, can only operate when investors keep their trust in the French government's capacity to service its debt (which in a recession inevitably increases). When investors trust the French government they are willing to buy the extra government bonds without requiring a higher interest rate. In this scenario of trust the French interest rate can indeed be kept unchanged. The reason is that in Germany the government has a budget surplus. When a government has a budget surplus it retires government bonds from the market. Put differently, the supply of German government bonds declines. In France the supply of government bonds increases. If markets trust the French government as much as they do the German government, they will be willing to compensate the reduced holdings of German government bonds in their portfolio by higher holdings of French government bonds. They consider German and French government bonds to be perfect substitutes. It follows that the French government can easily finance its budget deficit because bondholders (mainly German ones in this case) are willing to buy these French bonds.

Thus, in this benign scenario, we observe that capital markets in the monetary union play a stabilizing role: when France is in trouble because of a downturn in economic activity, capital markets will make it possible to transfer revenues from the booming country to the country in recession, thereby alleviating the pain of the recession.

The previous scenario was based on the assumption of trust. Let us now introduce the other scenario, in which the increased budget deficit and debt level in France lead investors to lose their trust in the French government. (This was the assumption we made implicitly in Section 1.3). This may happen if the recession is particularly deep, and a lot of uncertainty arises about the length of this recession. In this case, investors will start selling French government bonds and buying German government bonds. This leads to a liquidity flow from France to Germany (the opposite of what happened in the previous scenario) and an increase in the long-term interest rate in France coupled with a decline in Germany. The aggregate demand curve in France is pushed further down, thereby making the recession more intense and prolonging it. In Germany the opposite occurs. Note again the self-fulfilling nature of expectations. If the investors expect trouble with the French government deficits and debt because they fear a prolonged recession, their actions prolong the recession. Fear of problems makes these problems more likely to occur.

Thus, in this scenario of distrust the business cycle movements are amplified: the recession is deeper in France and the boom is more intense in Germany. Being in a monetary union then leads to more volatility of output and employment; not a very attractive feature.

Note also that in this scenario, the capital markets of the monetary union cease to be a stabilizing force. On the contrary, countries in a recession experience an outflow of capital, making the recession deeper, while countries experiencing a boom attract capital, making the boom more intense. Desynchronized business cycles in a monetary union make these business cycles more intense.

If France and Germany had chosen not to be in a monetary union, they could have mitigated these destabilizing dynamics. Take the case of France, and assume now that France has kept its monetary independence, issuing its own currency. When, during a recession, investors start selling French government bonds and switch to German bonds, they necessarily have to go through the foreign exchange market. Thus, they will sell French francs and buy German marks. The effect of this is that the French franc depreciates and the German mark appreciates. The French franc depreciation in turn tends to boost aggregate demand in France, while the appreciation of the German mark tends to reduce aggregate demand in Germany. There is a stabilizing effect from exchange rate changes, which is absent when France and Germany belong to a monetary union. Thus, in a monetary union business cycle movements will be amplified if the financial markets are not fully confident in the solvency of one or more of the member governments. In Box 1.2 we present a case study of the Eurozone during the recent 'Great Recession' and illustrate how asymmetric shocks were amplified by large divergent movements in the long-term interest rates.

BOX 1.2 Asymmetric shocks and debt accumulation in the Eurozone (2008–15)

The industrialized world was hit by a major financial crisis in 2007–8. This led to what has been called the 'Great Recession' of 2008–9, during which GDP declined significantly. From 2010, GDP growth resumed in most countries but at a very unequal pace. The divergence in the movements of GDP is particularly strong in the Eurozone. We show this in Fig. 1.6. This presents the cumulative growth of GDP from 2008 to 2015 in the Eurozone. We observe very large differences. Five northern Eurozone countries succeeded in overcoming the recession of 2008–9 and lifting their GDP above the level of 2008. This was not the case with Finland, the Netherlands, and the southern Eurozone countries, in which GDP remained significantly below the level of 2008. Thus, one can say that large asymmetric shocks (desynchronized business cycles) occurred in the Eurozone during 2008–15.

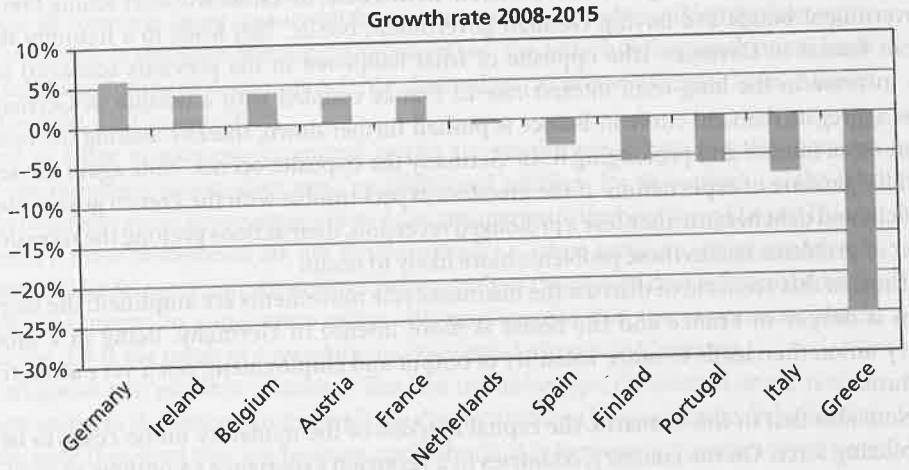

Figure 1.6 Cumulative growth of GDP (2008–15).

Source: European Commission, AMECO databank.

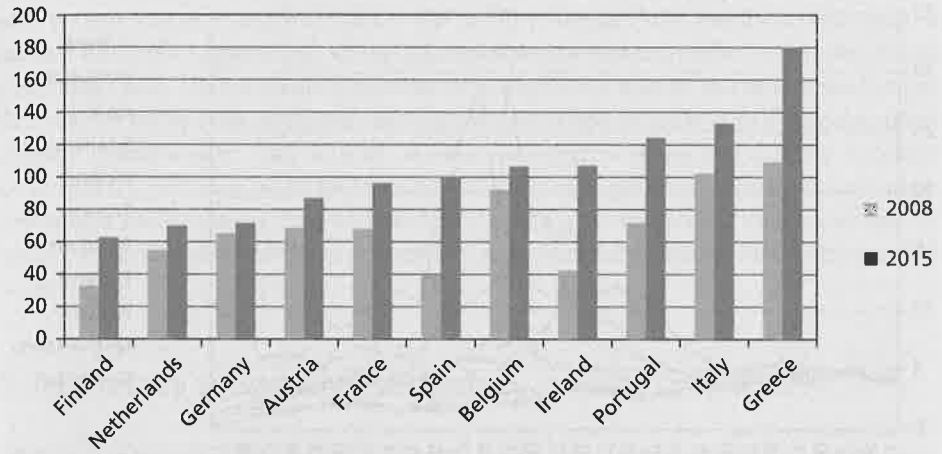

Figure 1.7 Government debt as a percentage of GDP.

Source: European Commission, AMECO databank.

These asymmetric shocks had important implications for government finances within the Eurozone. We show this in Fig. 1.7, which presents the government debt ratios (the ratios of government debt to GDP) in the Eurozone in 2008 and 2015. We observe everywhere significant increases in these government debt ratios, but also large differences in this increase. Belgium, Austria, Germany, and the Netherlands experienced relatively small increases, while most southern countries and Ireland experienced very large surges in their government debt ratios. This suggests that there is a strong correlation between the cumulative growth experiences of the Eurozone countries and the increase in their government debt ratios. We show this in Fig. 1.8. There is indeed a strong negative correlation. Countries that managed to grow during the period 2008–15 experienced weak increases in their government debt ratios. Countries that experienced sharp declines in GDP also saw their government debt ratios surge.

How did financial markets respond to these widely divergent movements in growth and budgetary performance within the Eurozone? We show the answer in Fig. 1.9. This presents the 10-year government

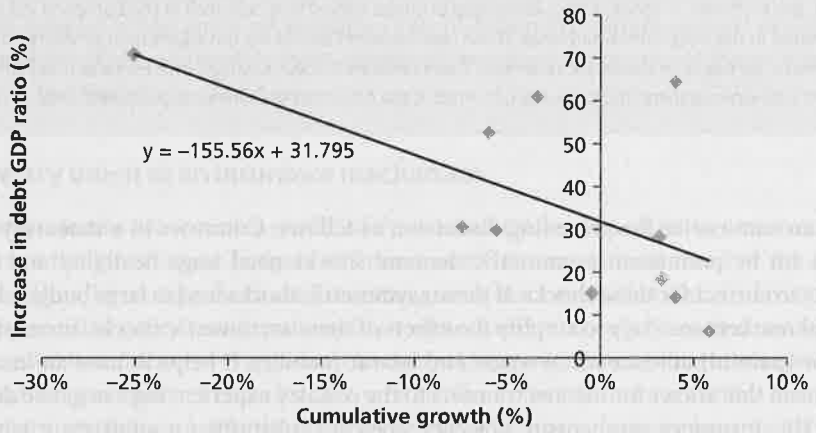

Figure 1.8 Cumulative growth and increase in debt ratios (2008–15).

Source: European Commission, AMECO databank.

(Continued...)

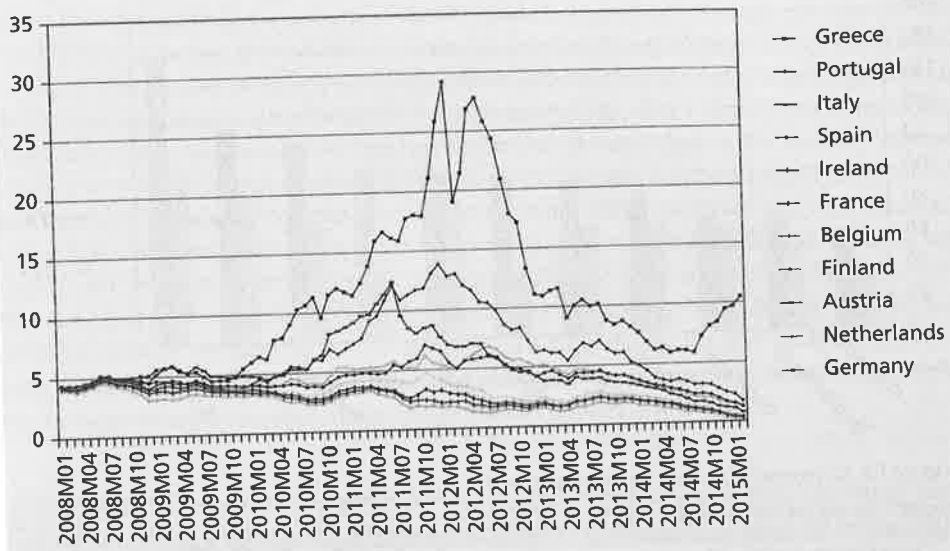

Figure 1.9 10-year government bond yields (monthly data)

Source: Eurostat.

bond rates in the Eurozone. While at the start of 2008 these bond rates were practically the same in all the Eurozone countries, by the end of 2008 large divergences had occurred. Financial markets lost confidence in the capacity of southern Eurozone countries and Ireland to continue to service an exploding government debt. As a result, they sold the government bonds of these countries, thereby raising the interest rates. The mirror images of these selling activities were the purchases of the government bonds of northern Eurozone countries. As a result, the long-term interest rates in these countries declined significantly. Note how in 2012 the bond rates of Southern Eurozone countries declined sharply. We will analyse this phenomenon when we discuss the role of the European Central Bank as a lender of last resort in Chapter 6.

Thus, the asymmetric shocks (desynchronized business cycles) that occurred in the Eurozone led to divergences in the long-term bond rates. These had the effect of making the adjustment problems of the countries hit by negative shocks more severe. These countries faced very high interest rates that further reduced economic activity. The opposite occurred in the countries experiencing positive shocks.

We can summarize the preceding discussion as follows. Countries in a monetary union that are hit by permanent asymmetric demand shocks need wage flexibility and labour mobility to correct for these shocks. If these asymmetric shocks lead to large budget deficits, financial markets are likely to amplify the effects of these asymmetric shocks, increasing the need for (painful) adjustment in wages and labour mobility. It helps to have an insurance mechanism that allows for income transfers to the country experiencing a negative demand shock. This insurance mechanism, however, does not substitute for adjustment when the demand shock is permanent. What it does is to give countries more time to effect the needed adjustment. To the extent that countries face rigidities and have poorly organized insurance systems, the costs of the monetary union may be substantial.

When asymmetric shocks are temporary, i.e. the results of unsynchronized booms and busts, the issue is not so much flexibility but stability. The fact that member countries of a monetary union are vulnerable to changing market sentiments can lead to more volatility in the business cycle. Thus, a country experiencing a recession and an increase in the budget deficit may be hit by large-scale sales of its government bonds, leading to a liquidity crisis and higher interest rates. This is likely to force the government of that country to introduce budgetary austerity, i.e. to increase taxes and reduce spending, thereby exacerbating the recession. Governments then find out that their capacity to stabilize their economies is severely curtailed, worse that they are forced to implement fiscal policies that destabilize the economy.

1.5 Monetary union and budgetary union

In Section 1.4 we saw that a monetary union can be very fragile. When it is hit by large asymmetric shocks, the member states of the union face difficult adjustment problems. Since asymmetric demand shocks will typically lead to increasing budget deficits in some countries, financial markets may force a liquidity crisis on these countries, thereby amplifying the asymmetric shocks. Can one design a mechanism that will alleviate these problems and thereby reduce the costs of a monetary union?

In principle, it is possible to design such a mechanism in two parts. The first one concerns the role of the common central bank in making it possible to avoid liquidity crises. The second one consists of centralizing a significant part of the national budgets into a common union budget. Here we concentrate on the second part. We will come back to the role of the common central bank in Chapter 6.

The centralization of national budgets amounts to having a monetary union together with a budgetary union. Such a budgetary union achieves two things. First, it creates an insurance mechanism triggering income transfers from the country experiencing good times to the countries hit by bad luck. In doing so, it reduces the pain in the countries hit by a negative shock. Second, a budgetary union allows consolidation of a significant part of national government debts, thereby protecting its members from liquidity crises and forced defaults. Let us analyse these two mechanisms.

A budgetary union as an insurance mechanism

Let us return to the two-country model of France and Germany and let us assume that a large part of the government budgets of France and Germany is centralized at the European level. Thus, let us suppose that a European government exists that directly levies taxes (including social security taxes) and directly transfers revenues (e.g. pensions, unemployment benefits) to residents in France and Germany. As a result of such budgetary centralization, a decline in output in France leads to a reduction in the tax revenues of the European government from France, while the tax revenues from Germany increase because German output has increased. At the same time, however, the European government increases its spending (unemployment benefits) in France and reduces these in Germany. The net result of all this is that the central budget automatically redistributes income from Germany where

output has increased to France where output has declined.[6] Put differently, this budgetary centralization allows French citizens to smooth consumption following a negative output shock. Note that there is also consumption smoothing in Germany, but in the other direction. As a result, the cost of the monetary union is reduced, i.e. French and German citizens can stabilize their consumption over time despite asymmetric shocks in output. The reason for Germany's interest in such a scheme is that it can profit from it when it suffers a negative shock.

Like in many insurance systems, the main problem of this insurance scheme is that it often leads to moral hazard. This is made clear by its operation within countries. In many countries (e.g. Belgium, Germany, Italy) the national budget automatically transfers income from regions with high output growth to regions with low growth. These transfers tend to reduce the pressure on regions to adjust. As a result they become permanent. The use of such schemes at the European level would certainly be problematic. It could lead to a situation in which the centralized budget induces large and permanent transfers from some countries to others. This would certainly create a lot of resistance in countries whose incomes are transferred to other countries.

A budgetary union as a protection mechanism

We have seen that a monetary union in which each country keeps its own budgetary independence is very fragile. In such a union, national governments issue debt in a currency they have no control over. This makes these governments vulnerable to movements of distrust that can lead to liquidity crises and forced defaults. It is now immediately evident that, in principle, a budgetary union can solve this problem. The reason is that in a budgetary union, national government debts are also centralized into a union government debt (or at least a significant part of national government debts are). As a result, the union government acquires the characteristics of a 'stand-alone' government, i.e. it issues debt in a currency over which it has full control. Thus, the union government cannot be confronted with a liquidity crisis (at least if the union maintains a flexible exchange rate with the rest of the world, as in our example of the United Kingdom). This budgetary union also implies that there is a strong union government capable of forcing the common central bank into providing for liquidity in moments of crisis.[7] In such a regime, national governments, which would have lost much of their sovereignty, would also be protected by the union government.

Is there any prospect that Europe could move into such a budgetary union? The European Union's budget amounts to only 1% of European Union GDP, while national budgets typically absorb 40% to 50% of GDP. There is very little prospect for the centralization of national budgets at the European level in the foreseeable future. Such centralization would require a far-reaching degree of political unification. It would require a large transfer of national sovereignty in the field of taxation and spending to a European government and parliament. There is simply no willingness in Europe to go in this direction. As a result the

[6] In some federal states there also exist explicit regional redistribution schemes. The most well-known of these is the German system of *Finanzausgleich*, in which *Länder* (states) whose tax revenues fall below some predetermined range receive compensation from *Länder* whose tax revenues exceed that range

[7] In Chapter 6 we analyse the role of the common central bank in a monetary union. to avoid the moral hazard problem.

insurance mechanism and the protection mechanism through budgetary centralization are simply not available in the European monetary union.

From the previous discussion, it follows that a monetary union without a budgetary union is likely to function in a very different way from a monetary union that is coupled with a budgetary union. The former can be labelled an 'incomplete monetary union', and the latter a 'full monetary union'. We will come back to this distinction in Chapter 5, where we will analyse different types of incomplete monetary union. We will analyse the fragility of incomplete monetary unions, and in particular of the Eurozone, which is an incomplete monetary union. In Chapter 6, we will analyse whether institutions can be created that, although they fall short of full budgetary and political union, may nevertheless provide some insurance and protection for the member states of an incomplete monetary union, such as the Eurozone. We will discuss how these institutions can be designed in such a way as to avoid the moral hazard problem.

1.6 Private insurance schemes

A budgetary union provides for an insurance mechanism in a monetary union. There is another way to organize an insurance scheme in a monetary union.[8] This scheme operates through the financial markets. We assume, as before, an asymmetric shock hitting France negatively and Germany positively. Suppose (and this is a crucial assumption) that the financial markets of France and Germany are completely integrated.

Let us concentrate here on how integrated bond and equity markets facilitate the adjustment.[9] As a result of the negative shock, French firms make losses, pushing down French stock prices. Since the equity market is fully integrated, French stocks are also held by German residents. Thus, the latter pay part of the price of the drop in economic activity in France. Conversely, the boom in Germany raises the stock prices of German firms. Since these are also held by French residents, the latter find some compensation for the hard economic times in France. Put differently, an integrated stock market works as an insurance system. The risk of a negative shock in one country is shared by all countries. As a result, the impact of the negative output shock in one country on the income of the residents of that country is mitigated.

A similar mechanism works through the integrated bond market. As a result of the negative shock, firms in France make losses, and some also go bankrupt. This lowers the value of the outstanding French bonds. Some of these French bonds are held by German residents, so that they also pay the price of the economic duress in France.

The advantage of this insurance scheme based on private financial markets is that it reduces the danger of moral hazard. However, there is also a large drawback. The poor unemployed in France who do not hold financial assets issued in Germany will obtain little compensation from this private insurance scheme. Instead the well-to-do French citizens with large portfolios of assets are more likely to obtain most of the transfers. As a result, such a private insurance scheme without a public one is certainly going to provide insufficient coverage for a large majority of French citizens.

[8] The importance of financial market integration in order for a monetary union to function well was first stressed by Ingram (1959).

[9] In Chapter 11, we go into more detail and also analyse the banking sector. Thus, we will assume there is one bond market and one equity market, and the banking sector is also completely integrated.

The benefits of a common currency

Introduction

Whereas the costs of a common currency have much to do with the *macroeconomic* management of the economy, the benefits are mostly situated at the *microeconomic* level. Eliminating national currencies and moving to a common currency can be expected to lead to gains in economic efficiency. These gains in efficiency have two different origins. One is the elimination of transaction costs associated with the exchanging of national moneys. The other is the elimination of risk coming from the uncertain future movements of the exchange rates. In this chapter we analyse these two sources of benefits of a monetary union. In addition, we will evaluate the benefits of creating a common currency, such as the euro, that has the potential of becoming an international currency.

3.1 Direct gains from the elimination of transaction costs

Eliminating the costs of changing one currency into another is certainly the most visible (and most easily quantifiable) gain from a monetary union. We all experience these costs whenever we exchange currency. These costs disappear when countries move to a common currency.

How large are the gains from the elimination of transaction costs? The EC Commission has estimated these gains, and arrives at a number between 13 billion and 20 billion euros per year.[1] This represents a quarter to a half of 1% of Community GDP. This may seem peanuts. It is, however, a gain that has to be added to the other gains from a monetary union.

It should be noted here that these gains that accrue to the general public have a counterpart somewhere. They are mostly to be found in the banking sector. Surveys in different countries indicate that about 5% of bank revenues are the commissions paid to banks in exchanging national currencies. This source of revenue for banks disappears with a monetary union.

The preceding should not give the impression that the gain for the public is offset by the loss for the banks. The transaction costs involved in exchanging money are a *deadweight* loss. They are like a tax paid by the consumer in exchange for which they get nothing. Banks, however, have a problem of transition: they have to look for other profitable activities. When this has been done, society has gained. The banks' employees, previously engaged in exchanging money, become free to perform more useful tasks for society.

[1] See EC Commission (1990).

An important point should be mentioned here. As long as payments systems are not fully integrated, bank transfers between member countries of EMU remain more expensive than bank transfers within the same country. The reason is that although the national payments systems are now linked up by the so-called TARGET system, these national systems are still in place. As a result, cross-border bank transfers follow a different, and more expensive, route from bank transfers within the same country (see Box 3.1).

In order to prevent banks in the Eurozone from applying charges to cross-border payments that are higher than those applied to national payments, a regulation was adopted to force banks to apply the same charges on Eurozone cross-border card payments, ATM withdrawals, and credit transfers of up to €50,000 as those for similar national payments. This regulation led Eurozone banks to create the European Payments Council, which in turn led to the creation of the Single Euro Payment Area (SEPA), which aims to simplify and codify payment standards across the Eurozone.

BOX 3.1 The TARGET payment system

In order for the Eurozone to function efficiently, the payment system must be integrated, so that cross-border payments can be handled as smoothly as payments within the same country. Key in this payment system are the transfers banks make to each other. These transfers are centralized at the central bank. This is also the reason why the central bank is called the 'bank of the banks'. Prior to the start of the Eurozone each country has its own payment system centralized by the national bank. There was therefore a need to integrate these payments systems in the Eurozone. This integration was achieved by the TARGET system. The main features of this system are the following:

- It is a real-time system. This means that the payments banks make to each other reach their destination 'instantaneously', i.e. with a delay of a few seconds or minutes.
- It is a gross settlement system. This means that the gross amount of each payment goes through TARGET. This requires the paying banks to provide collateral for each payment. This contrasts with a net settlement system, which is used in most national payments systems. In the latter, banks can accumulate net debtor or creditor positions during the day without having to provide collateral. These positions are settled at the end of the day.
- The fact that TARGET is a gross settlement system makes it an expensive one compared to net settlement systems. As a result, cheaper private payments systems have emerged based on net settlement.
- The reason why TARGET was selected is that it eliminates the risks that a bank default will have a domino effect on other banks involved in the payments chain.
- Since the sovereign debt crisis in 2010, major imbalances have occurred in the TARGET system, i.e. southern Eurozone countries that had accumulated large current account deficits were suddenly confronted with large liquidity outflows. The opposite occurred in the northern Eurozone countries that became the recipients of these liquidity flows. As a result, the southern Eurozone countries accumulated large liabilities in the TARGET system matched by claims of the northern European countries, mainly Germany. (See Sinn and Wollmershäuser, 2012, who have claimed that this will create large risks for the German taxpayer. See De Grauwe and Ji 2012 and Whelan 2012 for a criticism.) Since 2012 these imbalances in the TARGET system declined significantly as a result of reverse liquidity flows, i.e. liquidity inflows in southern Eurozone countries and outflows from northern Eurozone countries. Why this happened will be discussed in Chapter 6.

The European Commission issued a directive (the Payments Service Directive) that has given a legal basis to SEPA, which set in motion a process leading to a fully integrated payment system in the Eurozone. The first step was taken in January 2008 with the launch of the SEPA Credit Transfer. This allows banks that are active in the payment system to make transfers directly to all other participating banks. The final step was taken in November 2009. Since then customers of the banks have been able to make transfers across countries in the same way as they do within countries.[2] Thus, the transactions cost gains are fully realized in the Eurozone.

3.2 Indirect gains from the elimination of transaction costs: price transparency

The elimination of transaction costs also has an indirect (and less easily quantifiable) gain. The introduction of the euro should lead to more price transparency: i.e. consumers who now can see prices in the same currency unit are better able to make price comparisons, and to shop around. This in turn should increase competition. In the end this should benefit all consumers, who will face the same lower prices. The issue we want to analyse here is whether this effect is strong enough to lead to visible results in the way prices are set in the Eurozone.

There is much evidence that price discrimination is still practised widely in Europe. In Fig. 3.1, we illustrate this phenomenon for a wide range of brand-name products in the year

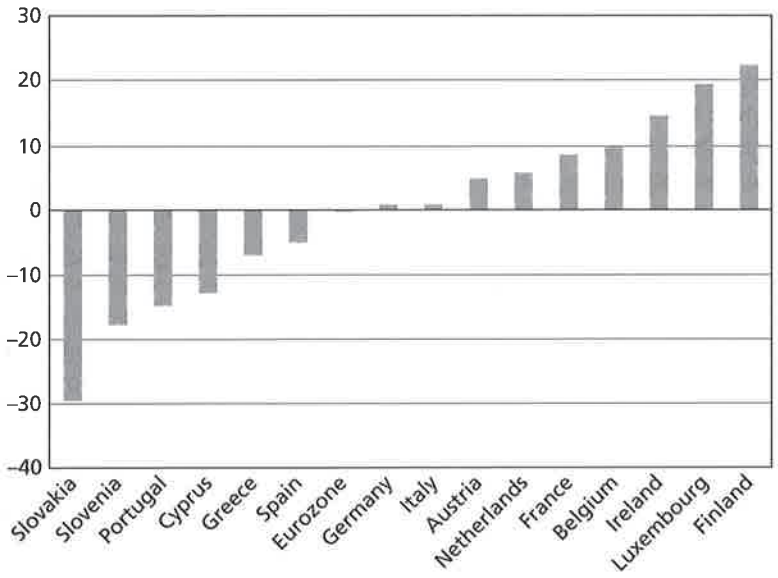

Figure 3.1 Price differentials for consumer goods (in percent) relative to Eurozone average (2011).
Source: Eurostat.

[2] For more detail, see European Central Bank (2008*a*).

2011. It shows the average price of a basket of goods and services in the Eurozone countries. The average price is expressed as an index relative to the Eurozone average. We observe that in Finland this basket of goods and services was 22% more expensive than in the Eurozone while in Slovakia this basket was 30% cheaper than the Eurozone average. Thus there was a price differential of 50% between the cheapest and most expensive country in the Eurozone.[3] These price differentials between countries are typically much larger than within countries. A similar phenomenon was observed by Charles Engel and Richard Rogers (Engel and Rogers 1995). They studied the price differentials of the same pairs of goods in different North American cities (in the USA and Canada). They found that crossing a border (in this case the US–Canadian border) is equivalent to travelling 2,500 miles within the same country. In other words, price differentials between Detroit and Windsor (which is just across the border) are of the same order of magnitude as the price differentials between New York and Los Angeles. Borders are quite powerful in segmenting markets and in introducing large differentials in prices. Thus, in Europe and North America the existence of borders continues to generate strong impediments to trade despite the fact that import tariffs and other explicit trade barriers have been abolished.

It is also useful to study the evolution of price convergence over time to see whether trends appear. We show the results of a study by Wolszczak-Derlacz (2006) in Fig. 3.2. It presents the price differentials (measured by the mean standard deviation) of 173 identical products across the Eurozone from 1990 to 2005. The remarkable observation is that price convergence occurred

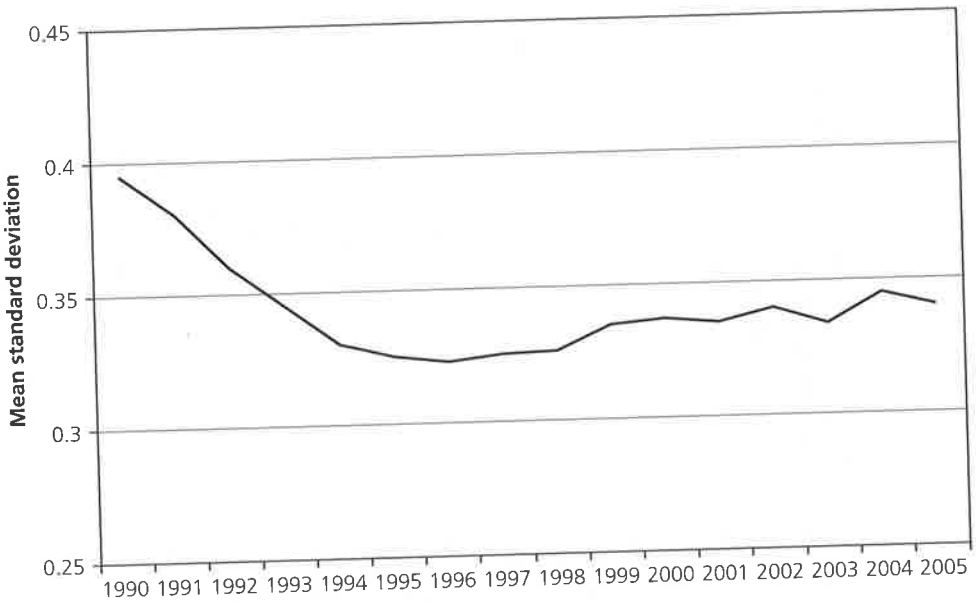

Figure 3.2 Evolution of price dispersion in the Eurozone, 1990–2005.

Source: Wolszczak-Derlacz (2006).

[3] Haskel and Wolf (2001) show that there are similar price differentials for exactly the same products sold by the furniture store IKEA across Europe. Price differentials in the automobile market are notorious. Baye et al. (2006) have shown that listed internet prices for a sample of items have not converged after the introduction of the euro.

prior to 1999 (mostly in the early 1990s).[4] Since the start of the Eurozone, price convergence has stopped.[5] This phenomenon has also been observed by the European Commission (see European Commission 2004). More recent empirical papers confirm that this lack of price convergence in the Eurozone is a continuing feature, i.e. there is no evidence that since 2005 price convergence has increased (see Parsley and Wei 2008 and Clementi et al. 2010). A recent study of the car markets in the Eurozone also confirms that the euro has had no effect in reducing the considerable price dispersion for the same cars within the Eurozone (Dvir and Strasser 2013).

Why does the introduction of the euro appear to be a weak force in bringing about price convergence? Many of the products in the sample of Wolszczak-Derlacz are supermarket products. The price differentials for supermarket products are the result of transaction costs. With or without the euro it remains very costly for individual consumers living in, say, Paris to make a trip to Berlin so as to profit from a price advantage for some (not all) groceries. Such arbitrage remains prohibitive in the Eurozone. But why then do we observe almost no price differentials for supermarket products within the same countries? The answer is that the retail business is still very much segmented nationally. In most countries, a few supermarket chains dominate the whole market. They conduct national commercial and advertising campaigns, setting prices for the whole national market. Part of the reason is that most of these supermarket chains are still very much national companies. The other part has to do with different regulations, customs, languages, and cultures. It is doubtful that the euro will overcome all this very soon.

Other products in the sample are electronic products (e.g. cameras, mobile phones, etc.). The price differentials for these products are due not so much to transaction costs. After all, it may pay to make a trip from Brussels to London to buy a portable PC. However, this is a sector of highly differentiated products, making precise price comparisons for consumers very difficult. This is also the reason why the price differentials for these products remain high also within countries with the same currency. Thus, although the euro may make price comparisons a little easier, it is doubtful that it will contribute much to eliminating the observed price differentials.

One may conclude that if the euro contributes to price convergence it will be not so much because it makes direct price comparisons for consumers easier. It will be because it may contribute to further economic integration in other ways. It is possible that the introduction of the euro stimulates financial integration (see Chapter 11 where we evaluate the extent to which the euro has stimulated financial integration). This in turn may set in motion a dynamics of integration in other areas. Financial market integration is likely to push for further legislative harmonization. Thus, the existence of the euro may become an important trigger for further integration in many other areas (political, legislative, regulations). If that occurs, a dynamic can be set in motion which is more important than the direct price comparison. It will take time, however, before it shows its effects.

3.3 Welfare gains from less uncertainty

Uncertainty about future exchange rate changes introduces uncertainty about future revenues of firms. It is generally accepted that this leads to a loss of welfare in a world populated

[4] This is also found by Engel and Rogers (2004).

[5] The slight increase in dispersion observed after 1999 is too small to be statistically significant.

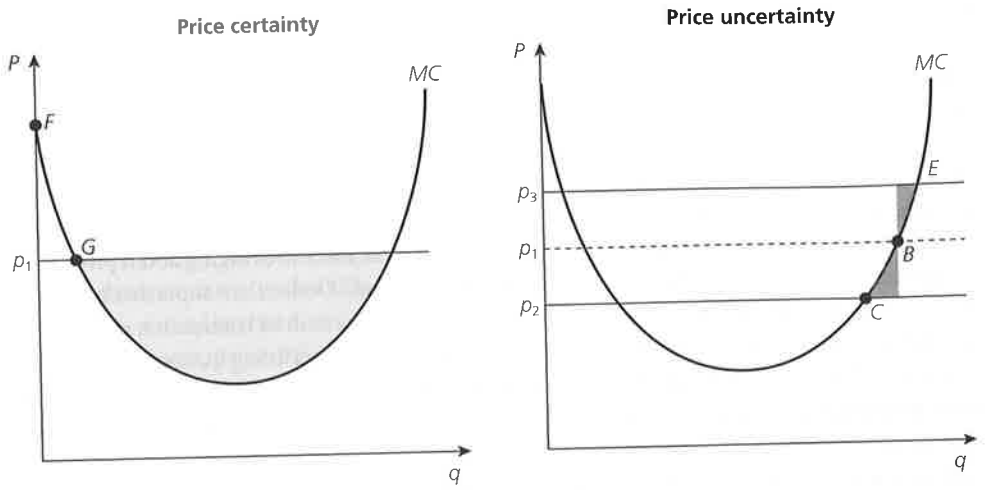

Figure 3.3 Profits of the firm under price certainty and uncertainty.

by risk-averse individuals. These will, generally speaking, prefer a future return that is more certain than one that is less so, at least if the expected value of these returns is the same. Put differently, they will only want to take the more risky return if they are promised that on average it will be higher than the less risky. Eliminating the exchange rate risk reduces a source of uncertainty and should therefore increase welfare.

There is one important feature of the theory of the firm that may invalidate that conclusion. Take a profit-maximizing firm that is a price-taker in the output market. Let us also assume that the firm exports its whole output. We represent its marginal cost curve and the price of its output in Fig. 3.3. The price the firm obtains is given by the price in the export market times the exchange rate. Suppose there are two regimes. In the first regime (presented in the left panel) the exchange rate is fixed. As a result, the price obtained by the firms is constant and perfectly predictable (assuming that the foreign currency price is constant). In the second regime (right panel) the exchange rate fluctuates randomly producing random price fluctuations. We assume here that the price fluctuates symmetrically between p_2 and p_3.

In the first regime of certainty, the profit of the firm in each period is given by the shaded area minus the area FGp_1. In the second, uncertain regime the profit will fluctuate depending on whether the price p_2 or p_3 prevails. We can now see that the profit will be larger on average in the uncertain regime than in the certain regime. When the price is low the profit is lower than in the certainty case by the area p_1BCp_2. When the price is high, the profit is higher than in the certainty case by the area p_3EBp_1. It can now easily be seen that p_3EBp_1 is larger than p_1BCp_2. The difference is given by the two shaded triangles.

This result may be interpreted as follows. When the price is high, the firm increases output so as to profit from the higher revenue per unit of output. Thus, it gains a higher profit for each unit of output it would have produced anyway, and *in addition* it expands its output. The latter effect is measured by the upper shaded triangle. When the price is low, however, the firm will do the opposite: it will reduce output. In so doing it limits the reduction in its total profit. This effect is represented by the lower shaded triangle.

If one wants to make welfare comparisons between a regime of price certainty and one of price uncertainty, the positive effect of price uncertainty on average profits should be compared to the greater uncertainty about these profits. The higher average profit increases the utility of the firm, whereas the greater uncertainty about these profits reduces the utility of the (risk-averse) firm. It is, therefore, unclear whether welfare declines when exchange rate uncertainty increases or, conversely, whether we can say with great confidence that the welfare of firms increases when national currencies are eliminated and a common currency is introduced.

Another way to put the preceding analysis is to recognize that changes in the exchange rate do not only represent a risk; they also create opportunities to make profits. When the exchange rate becomes more variable the probability of making large profits increases. In a certain sense, exporting can be seen as an *option*. When the exchange rate becomes very favourable the firm exercises its option to export. With an unfavourable exchange rate the firm does not exercise this option. It is well known from option theory that the value of the option increases when the variability of the underlying asset increases. Thus, the firm that has the option to export is better off when the exchange rate becomes more variable.

Many complications may be added to this theory. One may introduce the assumption of imperfect competition, or the assumption that firms face adjustment costs when they vary output.

These complications provide important insights into the effect of price uncertainty on average profits. In more complicated models, however, it is generally the case that price uncertainty *may* increase the average profits of the firm.

There is one aspect of uncertainty that is quite serious and that can undermine the relevance of the previous analysis. This is that exchange rate changes are not normally distributed. The nature of exchange rate movements is that there are periods of relative tranquillity followed by periods of great turbulence. During these turbulent periods, exchange rate changes can be very large and sustained in one direction, producing bubbles followed later by crashes. We show some examples involving the dollar versus the German mark and versus the euro in Fig. 3.4.

Such large movements in the exchange rate create 'tail risks', i.e. the risk of a very large change that occurs with low probability. When it occurs, the effect can be devastating. In the context of Fig. 3.3, the decline in the exchange rate can be so large that the price falls way below the marginal cost curve (and the average cost curve, which is not drawn here), forcing the firm to close its doors. The cost of bankruptcy and of reallocating the factors of production employed by these firms will typically be substantial, creating large costs of exchange rate movements.

Such large exchange rate movements are a recurrent problem with freely floating exchange rates. They create large adjustment costs and much economic misery. They also occurred massively within the European Union during the early 1990s, when some currencies (e.g. the Italian lira and the Spanish peseta) depreciated by 20 to 30% in a few weeks, creating large adjustment costs in countries like Germany and the Benelux.

These large exchange rate movements between the currencies of highly integrated countries were a major factor in convincing many leaders of these countries to move into a monetary union. There were two reasons for this. First, it was increasingly felt that it would be difficult if not impossible to manage exchange rates in an orderly fashion in a world of free capital mobility. We come back to this theme in Chapter 5, where we analyse why it is so difficult to manage exchange rates. Second, these exchange rate movements were increasingly seen as major sources of asymmetric disturbances, instead of being variables that could be used to adjust to asymmetric shocks.

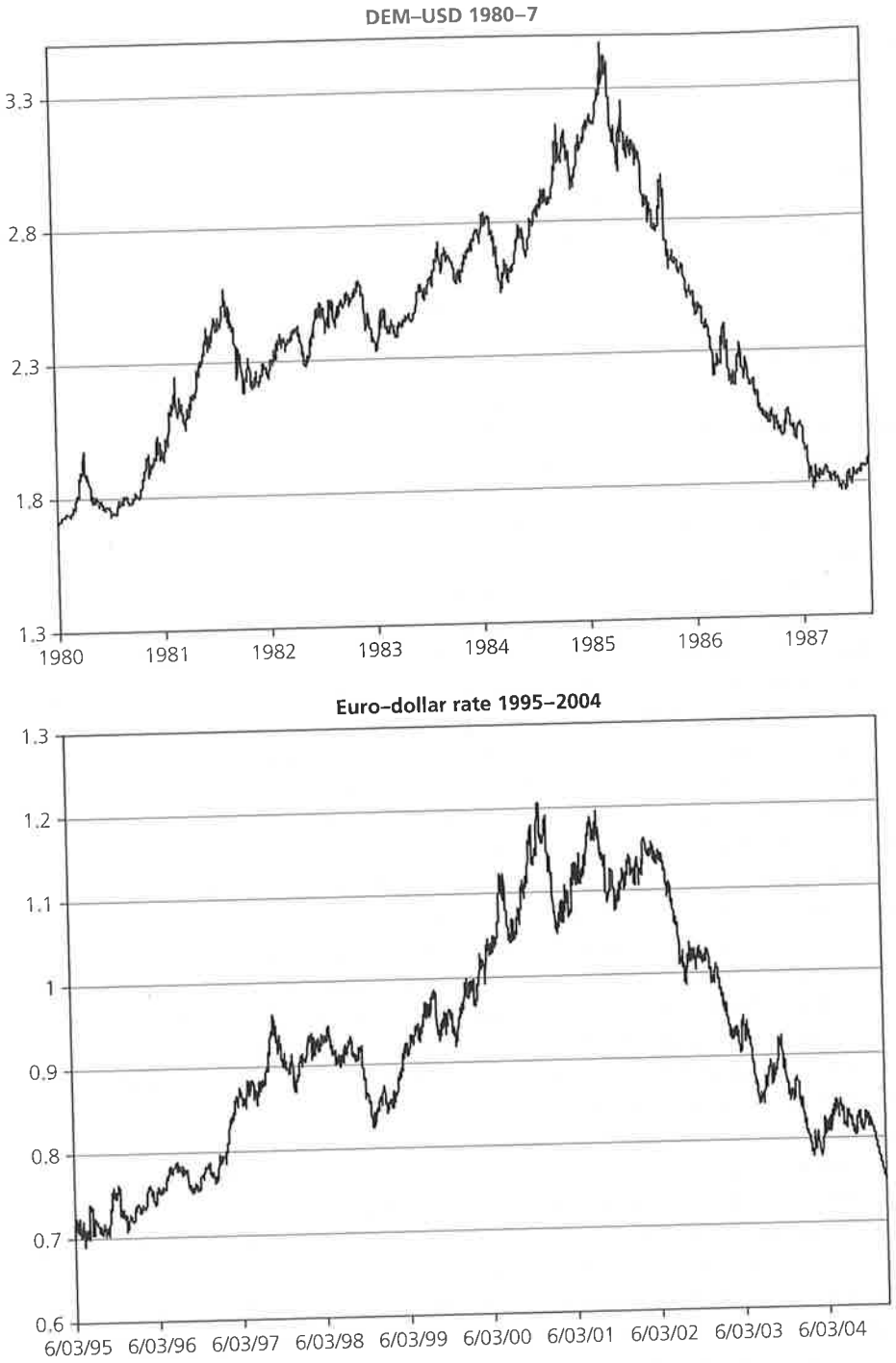

Figure 3.4 Bubbles and crashes in foreign exchange markets: two examples.

Note: The euro–dollar rate prior to 1999 is the DEM–dollar rate multiplied by the fixed DEM–euro conversion rate.

Source: De Grauwe and Grimaldi (2006).

3.4 Exchange rate uncertainty and economic growth

The argument that the elimination of the exchange risk will lead to an increase in economic growth can be made using the neoclassical growth model, and its extension to situations of dynamic economies of scale. This analysis featured prominently in the EC Commission report 'One Market, One Money' (1990), which in turn was very much influenced by Baldwin (1989). This analysis was very influential in selling the idea of a monetary union in Europe as a tool to boost economic growth.

The neoclassical growth model is represented in Fig. 3.5. The horizontal axis shows the capital stock per worker, and the vertical axis the output per worker. The line $f(k)$ is the production function, which has the usual concave shape, implying diminishing marginal productivities. The equilibrium in this model is obtained where the marginal productivity of capital is equal to the interest rate consumers use to discount future consumption. This is represented in Fig. 3.5 by the point A, where the line rr (whose slope is equal to the discount rate) is tangent to the production function $f(k)$. In this model, growth can only occur if the population grows or if there is an exogenous rate of technological change. (Note also that in this neoclassical model the savings ratio does not influence the equilibrium growth rate.)

We can now use this model as a starting point to evaluate the growth effects of a monetary union. Assume that the elimination of the exchange risk reduces the systemic risk. This will have the effect of lowering the real interest rate. The reason is that in a less risky environment, investors will require a lower-risk premium to make the same investment. In addition, when agents discount the future they will be willing to use a lower discount rate. We represent this effect in Fig. 3.6. The reduction of the risk-adjusted rate of discount makes the rr line flatter, twisting it to $r'r'$. As a result, the equilibrium moves from A to B. There will be an accumulation of capital and an increase in the growth rate while the economy moves from A to B. In the new equilibrium, output per worker and the capital stock each has at their disposal will have increased. Note, however, that the growth rate of output then returns to its initial level, which is determined by the exogenous rate of technological change and the rate of growth of the population. Thus, in

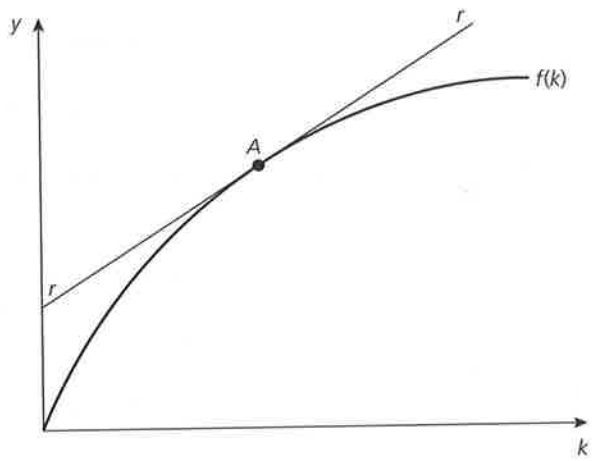

Figure 3.5 The neoclassical growth model.

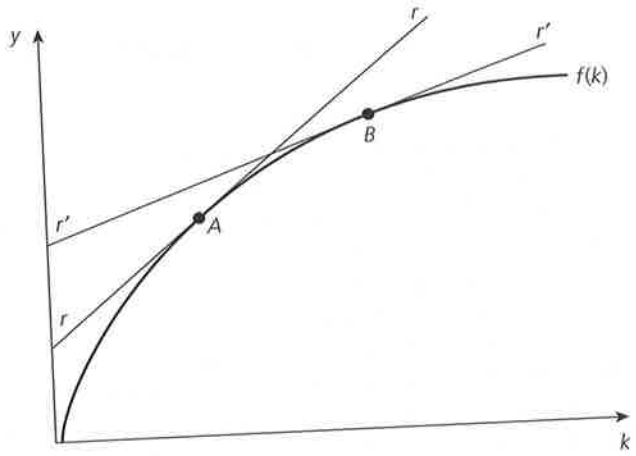

Figure 3.6 The effect of lower risk in the neoclassical growth model.

this neoclassical growth model, the reduction of the interest rate due to the monetary union *temporarily* increases the rate of growth of output. In the new equilibrium, the output *level* per worker will have increased. (Note also that the productivity of capital has declined.)

This model has been extended by introducing dynamic economies of scale (Romer 1986). Suppose the productivity of labour increases when the capital stock increases. This may arise because with a higher capital stock and output per worker there are learning effects and additional knowledge is accumulated. This additional knowledge then increases labour productivity in the next period. There may also be a public goods aspect to knowledge. Thus, once a new machine is in place the knowledge it embodies is freely available to the worker who uses it. All these effects produce increases in the productivity of labour over time when capital accumulates.

One of the interesting characteristics of these new growth models is that the growth path becomes endogenous, and is sensitive to the initial conditions. Thus, an economy that starts with a higher capital stock per worker can move on a permanently higher growth path.

A lowering of the interest rate can likewise put the economy on a permanently higher growth path. We represent this case in Fig. 3.7. As a result of the lower interest rate the economy accumulates more capital. Contrary to the static case of Fig. 3.6, however, this raises the productivity of the capital stock per worker. This is shown by the upward movement of the $f(k)$ line. The economy will be on a higher growth path.

How much of this promise has come through? Let's look at Fig. 3.8. We compare the growth of real GDP during 2000–14 of the euro area with the growth of real GDP in the US and in the EU-countries that are not members of the euro area (called EU-10). It is striking that GDP has increased at a significantly lower rate in the euro area than in the US and in EU-10. There may be many reasons why the growth rate was so low in the euro area, but if a monetary union was a growth-boosting machine, we would probably not have observed this. Note also the stagnation in the euro area since 2008 while the US and the EU-10 started a clear recovery. The impression we get is that there is very little evidence that the euro has boosted growth as was promised by the previous theoretical analysis.

Why is it that the theory predicting growth-boosting effects of monetary union does not seem to have been borne out? The main reason probably is that the reduced exchange rate

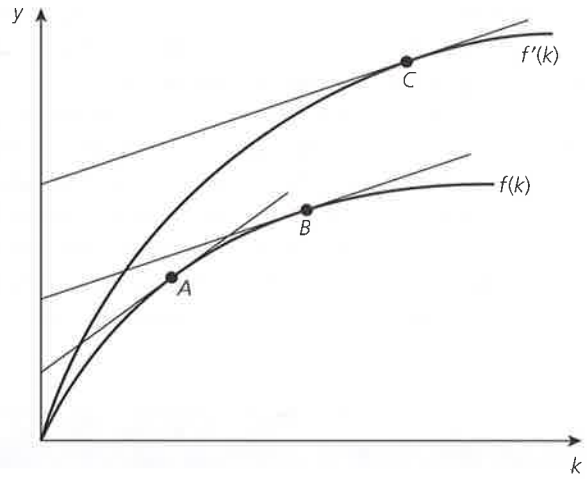

Figure 3.7 Endogenous growth in the 'new' growth model.

uncertainty within the union does not seem to have led to a significant decline in the real interest rate. There is very little evidence that the real interest rate in the Eurozone as a whole has come down.[6] Only in the 'catching up' countries such as Ireland, Spain, Portugal, and Greece did the real interest rate come down significantly. It is in these countries (with the exception of Portugal) that we observe an acceleration of economic growth as predicted by

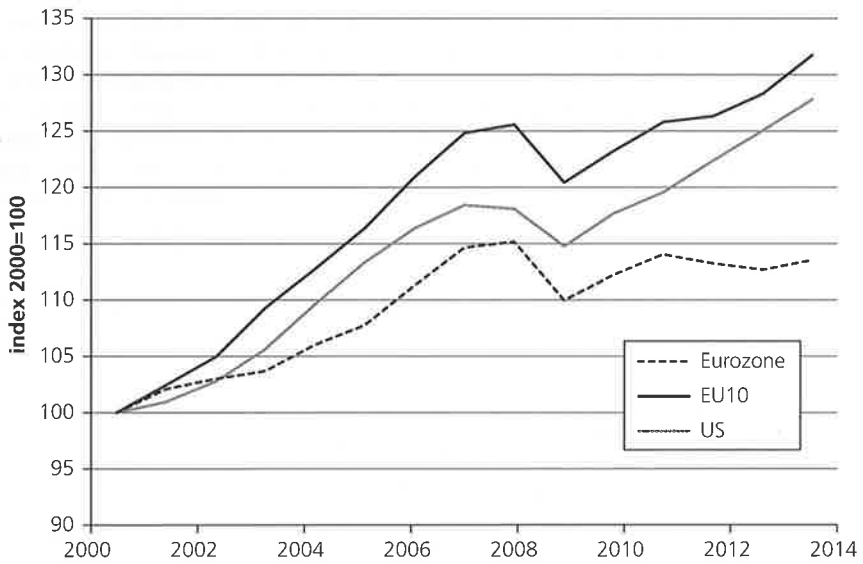

Figure 3.8 Real GDP in Eurozone, EU10, and US (prices of 2010).

Source: European Commission, AMECO.

[6] Note that since the financial crisis that erupted in 2007 the real interest rates have shown a tendency to decline. This phenomenon, however, has happened in most industrialized countries irrespective of whether they belong to the Eurozone or not (see Summers 2014 and Teulings and Baldwin 2014).

the theory. Much of this growth, however, turns out to have been temporary. In addition, the stagnation observed since 2008 is most probably related to the implementation of intense austerity programmes in a large number of Eurozone countries.

The weak link between exchange rate uncertainty, the real interest rate, and growth may also be due to the fact that the reduction in exchange rate uncertainty does not necessarily reduce the *systemic* risk. Less exchange rate uncertainty may be compensated by greater uncertainty elsewhere, e.g. output and employment uncertainty, and uncertainty about the sustainability of government debts. As a result, firms that operate in a greater monetary zone may not on average operate in a less risky environment. There is a whole theoretical literature, starting with William Poole (1970) that has analysed this problem. We present the main results in Box 3.2.

BOX 3.2 Fixing exchange rates and systemic risk

In a groundbreaking article, William Poole (1970) showed that fixing interest rates does not necessarily reduce the volatility of output compared to fixing the money stock. The argument Poole developed can easily be extended to the choice between joining a monetary union (irrevocably fixing the exchange rate) and staying outside the union (allowing for a flexible exchange rate).

We consider, first, random shocks occurring in the domestic goods market (business cycle shocks, for example). We present this by shifts in the *IS* curve. This now moves unpredictably between IS_U and IS_L.

Assume first that the country in question is a part of a monetary union. Thus, there is no longer any exchange rate to worry about. This implies that the domestic interest rate is equal to the union interest rate set by the union central bank. We represent the model graphically in Fig. 3.9.

Let us assume that the union central bank keeps the union interest rate unchanged. This is a rather strong assumption, since the central bank is likely to be influenced by what happens in the country analysed here, unless this country is small. Under those conditions the domestic interest rate is unchanged. Thus, output will fluctuate between y_L and y_U. Note that as the *IS* curve moves to, say, IS_U, the *LM* curve will automatically be displaced to the right, so that it intersects IS_U at the point *F*. This shift of the *LM* curve comes from the fact that the upward movement of the *IS* curve increases domestic income, which in turn leads to an increase in the domestic demand for money. This will attract money from the rest of the union, so that the domestic supply of money increases. Note again that we are assuming that the country involved here is small in relation to the union. If this is not the case, the domestic boom will put upward pressure on the union interest rate.

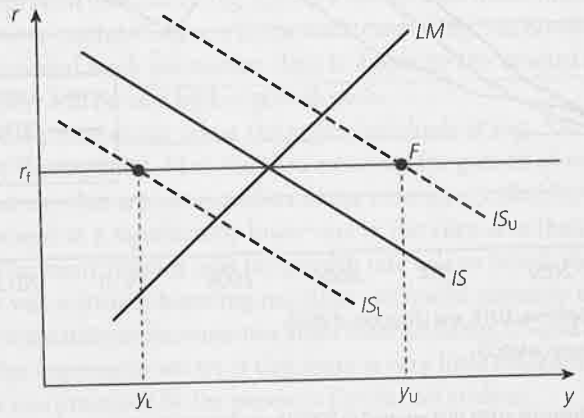

Figure 3.9 Shocks in the *IS* curve.

What happens if the country is not in the monetary union, and if it then allows its exchange rate to move freely? In this case the *LM* curve remains fixed. The same shocks in the *IS* curve now have no effect on the output level. The reason is the following. Suppose the *IS* curve shifts upwards (say, because of a domestic boom). This tends to increase the domestic interest rate. Since the exchange rate is flexible, there can be no increase in the money stock from net capital inflows. Instead, the increase in the domestic interest rate leads to an appreciation of the currency. This appreciation, in turn, tends to shift the *IS* curve back to the left. This will continue until the domestic interest rate returns to its initial level, which is only possible when the *IS* curve returns to its initial position.

We conclude from this case that being a member of the monetary union has led to more variability in the output market (and therefore also in the labour market) compared to being outside the union and letting the exchange rate vary. Joining the monetary union and thereby irrevocably fixing the exchange rate does not necessarily reduce systemic risk, because it leads to more uncertainty elsewhere in the system. Note that this is in essence the same conclusion as in the traditional theory of optimum currency areas in the presence of asymmetric shocks in the output market.[7]

This result, however, very much depends on the nature of the random shocks, which were assumed to come from the goods markets. Things are quite different if the random shocks originate from the money market.

Suppose that we have random disturbances in the demand for money (disturbances in velocity). We represent these by movements in the *LM* curve between the limits LM_L and LM_U in Fig. 3.10. Let us again consider the case where the country is in the monetary union. As before, this means that the domestic interest rate is fixed (assuming no shocks in the union interest rate). It can now immediately be established that there will be no change in output. The reason is the following. Suppose that the domestic demand for money has declined, leading to a rightward shift of the *LM* curve. This tends to reduce the interest rate. Such a reduction, however, is prevented by an immediate outflow of liquidity. The *LM* curve must return to its initial level. Thus, the domestic goods market is completely insulated from domestic money market disturbances when the country is in the union.

If the country is outside the union and allows the exchange rate to float, this will no longer be the case. Output will now fluctuate between the levels Y_L and Y_U. The intuition is that if the *LM* curve shifts to the right, the ensuing decline in the interest rate leads to a depreciation of the currency, whereas the domestic money supply remains unchanged. The decline in the interest rate and the depreciation tend to stimulate aggregate demand. This shifts the *IS* curve upwards until it intersects the LM_U line at point *G*. The goods market is not insulated from the money market disturbances.

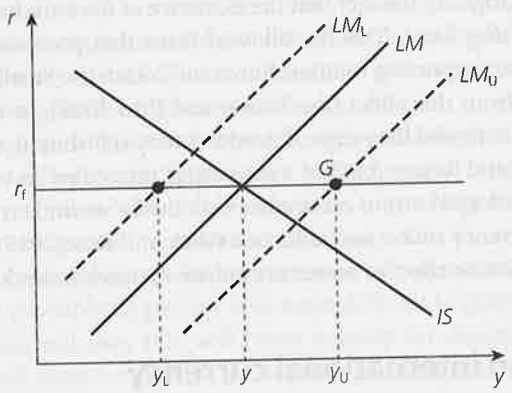

Figure 3.10 Shocks in the *LM* curve.

[7] The OECD provides some interesting evidence relating to this issue. It finds that output variability tends to be higher in member states of monetary unions. See OECD (1999*a*).

3.5 Monetary union and trade: the empirical evidence

Let us now concentrate on the trade effects of a monetary union. We identified two mechanisms through which a monetary union could increase trade among the members of a monetary union. The first one has to do with transaction costs: i.e. monetary union leads to fewer transaction costs and thus stimulates international trade. The second mechanism relates to exchange rate uncertainty. This could also be a factor that stimulates trade among the members of a monetary union.

What is the empirical evidence concerning the effects of a monetary union on trade? The first generation of econometric studies generally have found very little. These studies have typically been based on time series analysis, whereby bilateral trade flows were related to measures of exchange rate variability (and other control variables). Most of the time this relation was found to be weak and insignificant. Thus, it was concluded that eliminating exchange rate variability in the framework of a monetary union would have little effect on trade flows. (For a survey, see International Monetary Fund 1984.)

There is a second generation of econometric studies, pioneered by Andy Rose, which has come to very different conclusions. Using cross-section data, and controlling for a multitude of other variables that affect trade flows (e.g. income, distance, trade restrictions, language, and many more), Rose (2000) found that pairs of countries that are part of a monetary union have trade flows among themselves that, on average, are 200% higher than those among pairs of countries that are not part of a monetary union. We discussed these studies in Chapter 2 and we came to the conclusion that these trade effects of a monetary union are overestimated. In addition, in the absence of a good theory about how monetary union boosts trade, aggregate estimates of the correlation between monetary union and trade are unreliable (see Baldwin (2006)).

Several studies have attempted to overcome this criticism by looking at the sectoral and microeconomic evidence (Flam and Nordström 2006; Baldwin et al. 2008; Berger and Nitsch 2008; Nitsch and Pisu 2008). Estimates of the euro effect on trade within the Eurozone found in these studies vary between 5% and 20%. The mechanism through which the euro has boosted trade finds its origin in the fact that the existence of the euro has lowered fixed and variable costs of exporting firms. This has allowed firms that previously only catered for domestic markets to start exporting to other Eurozone countries. Small firms in particular seem to have profited from this effect (see Nitsch and Pisu 2008). In addition, firms that already exported have increased the range of products they sell abroad.

Finally in 2015 Glick and Rose published a surprising 'mea culpa' in which they admitted that using post-EMU data and various econometric methods 'we find no substantive reliable and robust effect of currency union on trade' (see Glick and Rose 2015). We conclude that the evidence about a positive effect of monetary unions on trade is weak.

3.6 Benefits of an international currency

When countries form a monetary union, the new currency that comes out of this union is likely to weigh more in international monetary relations than the sum of the individual currencies prior to the union. As a result, the new common currency is likely to find increasing

use outside the union. This creates additional benefits of the monetary union. In this section, we analyse the nature of these benefits. In Chapter 11, we turn to the issue of whether and how quickly the euro can become an international currency like the dollar, and thereby reap the benefits that will be described here.

The advantages of having a currency that is used as a unit of account and a medium of exchange in the rest of the world are significant. We distinguish three sources of benefits.

First, when a currency is used internationally, the issuer of that currency obtains additional revenues. For example, in 1999 more than half of the dollars issued by the Federal Reserve were used outside the USA. This situation has the effect of more than doubling the size of the balance sheet of the Federal Reserve compared to a situation in which the dollar is only used domestically. It follows that the Federal Reserve's potential profits are also more than doubled. Since these profits go to the US government, US citizens enjoy the benefits of the worldwide use of the dollar in the form of lower taxes needed to finance a given level of government spending. If the euro becomes a world currency like the dollar, citizens of the Eurozone will enjoy similar benefits. In fact, there is some evidence that the euro is used in Central and Eastern Europe, creating revenues for the citizens of the Eurozone.

One should not exaggerate these benefits, however. The total profits of the US Federal Reserve amount to less than 0.5% of US GDP. Thus, the additional revenues from having an international currency remain relatively small.

A second source of benefit has to do with the fact that an international currency is also one that is held as international reserve by foreign central banks. Typically, these reserves are held not in the form of cash but as Treasury securities. Thus the Central Bank of China holds more than one trillion dollars in the form of US Treasury securities. Other Asian central banks also hold many hundreds of billions of dollars of US Treasury securities. These foreign holdings have been an important source of easy finance for US budget deficits during the last decade. The peculiarity of this finance is that the foreign holders bear the exchange risk. It is in this connection that the French President, de Gaulle, talked about the 'exorbitant privilege' of the US (see Eichengreen 2012).

The euro is increasingly held as a reserve currency by foreign central banks. According to the ECB, in 2010 the euro represented about 27% of all central banks' international reserves (against about 60% for the dollar). Thus it appears that euro area treasuries are also finding new sources of financing for their government budget deficits.

There is also a danger in such a trend. Easier finance can lead governments to make excessive use of this finance. During the decade prior to the financial crisis this was certainly the case with the US government, which did not hesitate to run large budget deficits thanks to the easy access to credit granted by Asian central banks. This in turn helped to finance an unsustainable consumption boom, which came to a crashing end in 2008.

A third benefit is probably larger, but also more difficult to quantify. When a currency becomes an international one, this will boost activity for domestic financial markets. Foreign residents will want to invest in assets and issue debt in that currency. As a result, domestic banks will attract business, and so will the bond and equity markets. This in turn creates know-how and jobs. Thus, if the euro becomes an international currency like the dollar, this is likely to create new opportunities for financial institutions in the Eurozone.

Here also a word of caution is necessary. Some countries such as the UK have been able to attract financial activities from the rest of the world without the support of a local currency that is a true international currency. The City of London is now a major centre of international finance, despite the fact that the pound sterling no longer plays a major role in the world. Thus, having an international currency is not a necessary condition for generating financial services that the rest of the world is willing to pay for. Nor is it a sufficient condition, for that matter. We come back to this issue in Chapter 11, when we discuss the conditions under which the euro could become a world currency.

3.7 Benefits of a monetary union and the openness of countries

As discussed in Chapter 1 on the costs of a monetary union, we can also derive a relationship between the *benefits* of a monetary union and the openness of a country. The welfare gains of a monetary union that we have identified in this chapter are likely to increase with the degree of openness of an economy. For example, the elimination of transaction costs will weigh more heavily in countries where firms and consumers buy and sell a large proportion of goods and services in foreign countries. Similarly, the consumers and the firms in these countries are more subject to decision errors because they face large foreign markets with different currencies. Eliminating these risks will lead to a larger welfare gain (per capita) in small and open economies than in large and relatively closed countries.

We can represent graphically this relationship between the benefits of a monetary union and the openness of the countries that are candidates for a union. This is done in Fig. 3.11. On the horizontal axis we show the openness of the country relative to its potential partners in the monetary union (measured by the share of their bilateral trade in the GDP of the country considered). On the vertical axis we represent the benefits (as a percentage of GDP). With increasing openness towards the other partners in the union, the gains from a monetary union (per unit of output) increase.

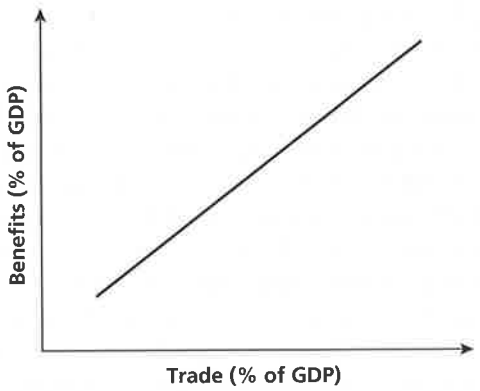

Figure 3.11 Benefits of a monetary union and openness of the country.

4 Costs and benefits compared

Introduction

In the previous chapters, the costs and benefits of a monetary union were identified. In this chapter, we conclude this discussion by comparing the benefits with the costs in a synthetic way. This will allow us to evaluate the wisdom of the EU countries when they decided to launch EMU, and the risks they took. In addition it will make it possible to draw some conclusions about the economic desirability of joining EMU for the new EU member states that are waiting to enter and for those that today still hesitate to do so. We will also apply this cost–benefit analysis to other parts of the world: Latin America, East Asia, and West Africa.

4.1 Costs and benefits compared

It is useful to combine the figures (derived in the previous chapters) relating benefits and costs to the openness of a country. This is done in Fig. 4.1. The intersection point of the benefit and the cost lines determines the critical level of openness that makes it worthwhile for a country to join a monetary union with its trading partners. To the left of that point, the country is better off keeping its national currency. To the right it is better off when it relinquishes its national currency and replaces it with that of its trading partners.

Fig. 4.1 allows us to draw some qualitative conclusions concerning the importance of costs and benefits. The shape and the position of the cost schedule depend to a large extent on one's view about the effectiveness of national monetary policies, including exchange rate policies, in correcting for the effects of different demand and cost developments between the countries involved.

At one extreme, there is a view, which will be called 'monetarist', claiming that national monetary policies are ineffective as instruments to correct for asymmetric shocks, be they permanent or temporary. And even if they are effective, according to this view, the use of these policies typically makes countries worse off. In this 'monetarist' view the cost curve is very close to the origin.[1] We represent this case in Fig. 4.2(*a*). The critical point that makes it worthwhile to form a union is close to the origin. Thus, in this view, many countries in the world would gain by relinquishing their national currencies and joining a monetary union.

[1] This is the view taken by the drafters of the influential EC Commission report (1990).

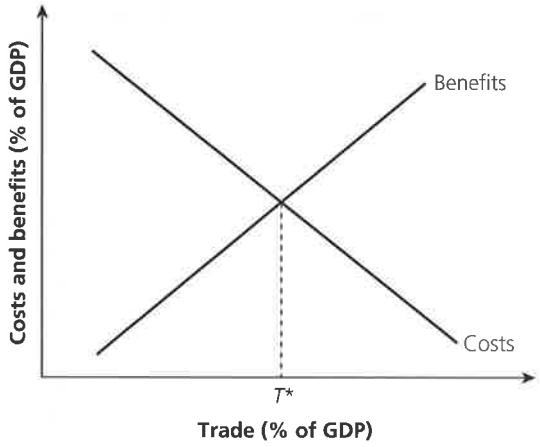

Figure 4.1 Costs and benefits of a monetary union.

At the other extreme, there is the 'Keynesian' view that the world is full of rigidities (wages and prices are rigid; labour is immobile), so that national monetary policies and the exchange rate are powerful instruments in absorbing asymmetric shocks. This view is well represented by the original Mundell model discussed in Chapter 1. In this view, the cost curve is far away from the origin, as shown in Fig. 4.2(*b*), so that relatively few countries should find it in their interest to join a monetary union. It also follows from this view that many large countries that now have one currency would be better off (economically) splitting the country into different monetary zones.

It is undeniable that since the early 1980s the 'monetarist' view has gained adherents, and has changed the view many economists have about the desirability of a monetary union. The popularity of monetarism helps to explain why EMU became a reality in the 1990s. The sovereign debt crisis that erupted in 2010 and the difficulties experienced in many Eurozone

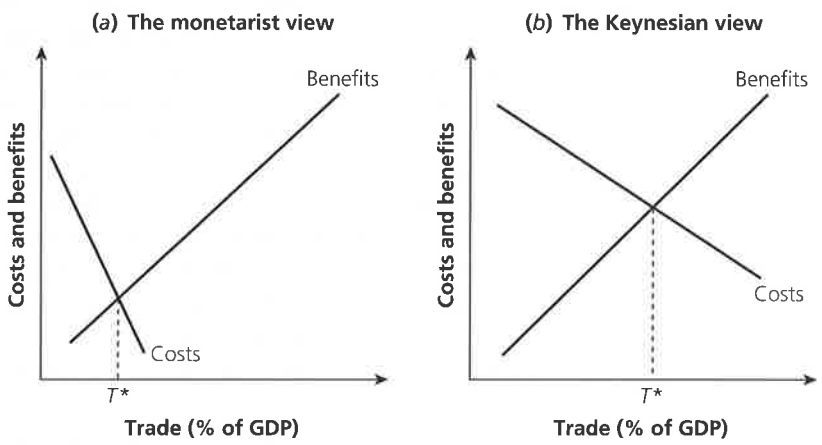

Figure 4.2 Costs and benefits of a monetary union: two views.

Table 4.1 Intra-EU exports of EU countries (% of GDP) in 2012

Slovakia	71.7
Hungary	67.2
Czech Republic	65.8
Belgium/Luxembourg	62.5
Netherlands	61.4
Slovenia	52.7
Estonia	49.5
Lithuania	42.6
Ireland	34.0
Latvia	31.8
Austria	30.4
Poland	28.5
Germany	24.9
Denmark	22.0
Portugal	19.5
Sweden	19.1
Malta	17.3
Finland	16.0
Italy	13.7
Spain	13.5
France	12.4
United Kingdom	10.8
Greece	6.0
Cyprus	5.1

Source: European Commission, *European Economy*, Statistical Appendix.

countries since then is likely to have reduced this popularity. It is not to be excluded that this may lead to a reappraisal of the desirability of a monetary union also by the present members of the Eurozone.

What does this analysis teach us about the issue of whether EMU is an optimal currency area? In order to answer this question, we first present some data on the importance of intra-EU trade for each EU country. The data are in Table 4.1, the most striking feature of which is the large differences in openness among the EU countries. This leads immediately to the conclusion that the cost–benefit calculus is likely to produce very different results for the different EU countries. For some countries with a large degree of openness relative to the other EU partners, the cost–benefit calculus is likely to show net benefits of being in EMU. This is most likely to be the case in the Benelux countries, Austria, Ireland, and the new EU member countries, the Czech and Slovak Republics, Estonia, Hungary, and Slovenia. It is very striking to find that the Central European countries that joined the European Union in 2004 are at least as well integrated with the rest of the EU as the older member countries. For countries at the other end of the ranking, the UK, Cyprus, and Greece, it is less clear that they belong to an optimal currency area with the rest of the EU.

It will remain difficult, however, to draw a precise line and to conclude that those above the line are part of an optimal currency area and those below do not form an optimal currency

area with the other EU member states. The reason is twofold. First, there are other important parameters that have to be drawn into the analysis, e.g. the degree of flexibility and the degree of asymmetry of shocks. We will return to this issue in the next sections. Second, the degree of 'completeness' of a monetary union matters for its costs and benefits. We take up this issue in Section 4.4.

Additionally, some countries with a low trade share may nevertheless find it advantageous to be in a monetary union. Our analysis of the credibility issues makes it clear that traditionally high-inflation countries, such as Greece or Italy, might have decided that it was in their interest to be in EMU despite the fact that their share of trade with the members of the union is relatively low. In terms of the analysis of Fig. 4.2, this implies that the Greek and Italian authorities did not consider the loss of their national monetary policy instruments costly, so that the minimum trade share that makes the union advantageous is very low. Put differently, if one is sufficiently 'monetarist', one could argue that for countries with low degrees of openness, the benefits could still outweigh the costs, and being in a monetary union could also make sense for them from an economic point of view.

4.2 Monetary union, price and wage rigidities, and labour mobility

The cost–benefit calculus of a monetary union is also very much influenced by the degree of wage and price rigidities. As will be remembered from our discussion in Chapters 1 and 2, when countries face permanent asymmetric shocks, requiring changes in relative prices, losing the exchange rate can be a handicap in that it makes the adjustment to these shocks more difficult. As a result, countries in which the degree of wage and price rigidities is low experience lower costs when they move towards a monetary union. We show this in Fig. 4.3.

A decline in wage and price rigidities has the effect of shifting the cost line in Fig. 4.3 downwards. As a result, the critical point at which it becomes advantageous for a country to

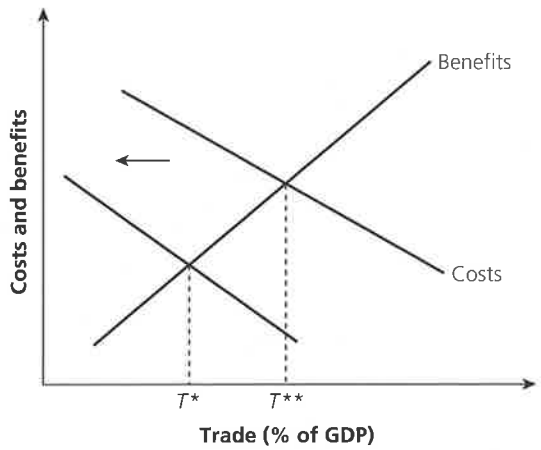

Figure 4.3 Costs and benefits with decreasing rigidities.

relinquish its national currency is lowered. More countries become candidates for a monetary union.

In a similar way, an increase in the degree of mobility of labour shifts the cost curve to the left and makes a monetary union more attractive. It should be noted, however, that not all forms of integration have these effects. As stressed in Chapter 2, economic integration can also lead to more regional concentration of industrial activities. This feature of the integration process changes the cost–benefit calculus, in that it shifts the cost curve to the right and makes a monetary union less attractive.

4.3 Asymmetric shocks and labour market flexibility

It is not only the degree of labour market flexibility (wage flexibility and labour mobility) that matters for determining whether a monetary union will be attractive to countries. Also important are the size and the frequency of asymmetric shocks to which they are subjected. This means that countries that experience very different demand and supply shocks (because their industrial structures differ greatly) will find it more costly to form a monetary union. In the framework of Fig. 4.3 this means that the cost line shifts to the right.

We are now in a position to analyse the relation between labour market flexibility and asymmetric shocks in a monetary union. This is done graphically in the following way (see Fig. 4.4). On the vertical axis we set out the degree of symmetry between regions (countries) that are candidates to form a monetary union. By symmetry is meant here the degree to which growth rates of output and employment are correlated. Thus, as we move up vertically, symmetry increases, or put differently the extent to which asymmetric shocks occur declines.[2] On the horizontal axis we have the degree of flexibility of the labour markets in these regions (countries). The flexibility here relates to wage flexibility and inter-regional (international) mobility of labour.

The central insight of the theory of optimum currency areas (OCAs) is that countries or regions that experience a lot of asymmetry in output and employment growth need much

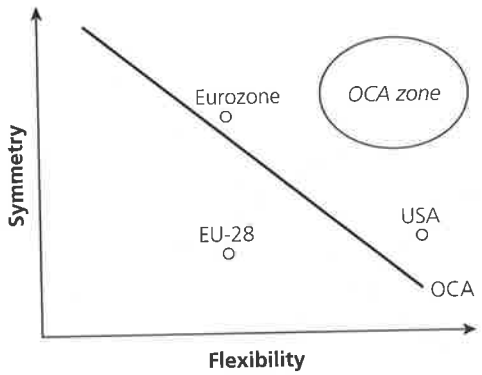

Figure 4.4 Symmetry and labour market flexibility in monetary unions.

[2] These asymmetric shocks are those that occur independently from the monetary regime, which were described in Chapter 1. Asymmetric shocks that are the result of divergent national monetary policies are not included. In a monetary union these would disappear.

flexibility in their labour markets if they want to benefit from monetary union, and if they wish to avoid major adjustment problems. Put differently, the lower the degree of symmetry, the greater is the need for flexibility in the labour markets to make a smoothly functioning monetary union possible. This relationship between symmetry and flexibility is represented by the downward-sloping line *OCA*. It shows the minimum combinations of symmetry and flexibility that countries must have in order for a monetary union to provide more benefits than costs. Countries or regions located below the *OCA* line do not have enough flexibility given the level of symmetry they face. They are likely to experience large adjustment costs as a result of asymmetric shocks. They do not form an optimum currency area. They are, therefore, well advised to maintain some degree of exchange rate flexibility. Of course, these countries are still free to form a monetary union. The theory, however, predicts that they will suffer economically from this decision. Conversely, countries to the right of the *OCA* zone have a lot of flexibility given the level of symmetry they face. In other words, they will be able to adjust to asymmetric shocks without incurring large adjustment costs. The benefits of a monetary union exceed the costs for these countries. They form an optimal currency area. We call the zone to the right of the *OCA* line the *OCA* zone.

Where should the European Union be located in Fig. 4.4? Since 2013, the European Union has consisted of 28 member countries. Ten new member countries were added to the union in May 2004, two more in 2007, and one in 2013. Most of the empirical studies have looked at this question from the point of view of the EU consisting of 15 member countries (EU-15). There is a broad consensus among economists, who have tried to implement the theory empirically, that the *EU-15 is not an optimum currency area.* (See Eichengreen 1990; Neumann and von Hagen 1991; Bayoumi and Eichengreen 1993, 1997; De Grauwe and Heens 1993; De Grauwe and Vanhaverbeke 1990; Beine et al. 2003.)[3] Some studies were undertaken analysing the optimality of a monetary union involving the European Union of 25 member countries (EU-25) that existed prior to the entry of Bulgaria and Romania in 2007 and Croatia in 2013 (see Korhonen and Fidrmuc 2001). These studies came to the same conclusion that the EU-25 was probably not an optimal currency area. Thus, according to these empirical studies, the EU-25 was located below the *OCA* line. As a result, from an economic point of view, a monetary union involving all EU member countries is a bad idea. The economic costs of a monetary union are likely to be larger than the benefits for a significant number of countries. (In Box 4.1, we present a case study illustrating the methodology used in many empirical studies.)

BOX 4.1 Empirical studies of the optimal size of monetary unions: methodological issues

Most of the empirical studies of the optimal size of monetary unions have concentrated on measuring the size and the nature of asymmetric shocks. The major problem encountered when doing this is that some of the asymmetric shocks may not be exogenous, i.e. these shocks may arise precisely because countries are not in a monetary union. For example, when a country has its own national money and central bank, it is likely to follow policies that are not identical to the monetary policies followed

(Continued...)

[3] A dissenting view is presented in EC Commission (1990). See also Gros and Thygesen (1998).

elsewhere. As a result, the movements of output and prices will be different from those observed in other countries. We will observe asymmetric shocks. These asymmetric shocks, however, are likely to disappear once this country joins a monetary union because national monetary policy will no longer be a source of asymmetric shocks.

In order to deal with this problem, Blanchard and Quah (1989) developed a statistical methodology, and Bayoumi and Eichengreen (1993) implemented it in the context of optimal currency areas. It consists of extracting from the price and output data the underlying demand and supply shocks. This is done by first estimating Vector Autoregressions (VAR). In a second step, demand and supply shocks are identified by assuming that demand shocks have only temporary effects while supply shocks have permanent effects on prices and output. Thus, the demand shocks are really temporary shocks while the supply shocks are permanent shocks (and could therefore also originate from the demand side). This extraction of demand and supply shocks is done for all the prospective members of the monetary union, and the correlation of these demand and supply shocks with the average of the union is then computed. The idea behind this exercise is that once in a monetary union, the asymmetric supply shocks (permanent shocks) that have a structural nature are likely to continue to exist, while the asymmetric demand shocks (temporary shocks) are more likely to disappear, if not completely then at least to a large degree.

We show the result of such an exercise performed by Korhonen and Fidrmuc (2001) in Fig. 4.5.[4] Each point represents the correlation coefficient of demand shocks with average demand shocks (vertical axis) and supply shocks with average supply shocks (horizontal axis) in the euro area. The results are quite instructive. First, we find relatively high correlations of the large countries (France, Germany, and Italy) with the euro area. This is not surprising because these large countries make up a significant part of the euro area. Second, although some Central European countries (Hungary and Estonia) are well correlated

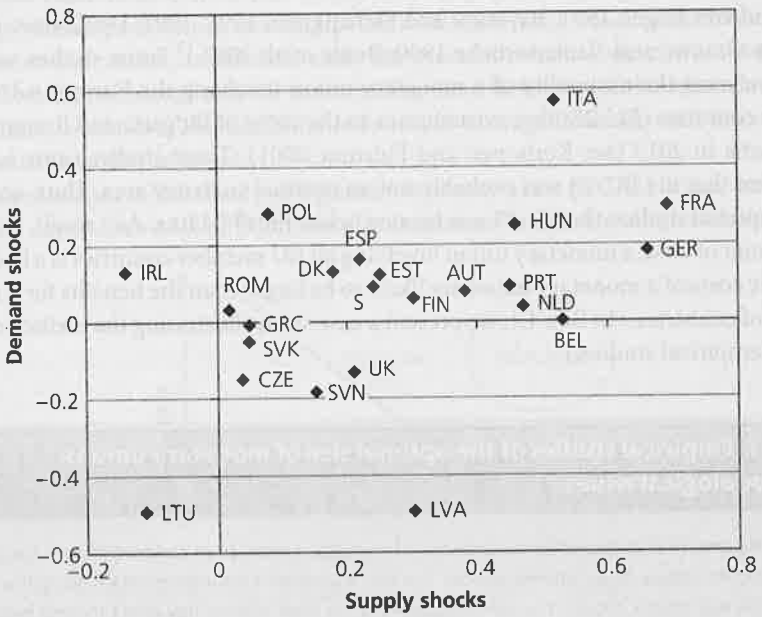

Figure 4.5 Correlation of demand and supply shocks within the Eurozone.

Source: Korhonen and Fidrmuc (2001).

[4] A similar analysis was performed by Frenkel et al. (2002).

with the euro area both for the demand and supply shocks, this is much less the case with others. A large number of them have negative correlations of their demand shocks (Lithuania, Latvia, Czech Republic, Slovenia, and Slovakia). Such negative correlations undoubtedly are partly the result of the fact that some of these countries pursued independent monetary policies when they were not in the Eurozone. Once in a monetary union, this source of asymmetry may disappear for those central European countries that joined the Eurozone (Lithuania, Latvia, Slovenia, and Slovakia). A more troublesome feature is that the correlation of the supply shocks of the Central European countries with the euro area is rather low. This source of asymmetry is unlikely to disappear in a monetary union.

Finally, the position of the UK is noteworthy. This country's correlation of demand shocks is also negative, reflecting to a certain degree the fact that it pursues its own national monetary policies quite independently from what happens in the euro area. At the same time, the correlation of the supply shocks with the euro area is rather low.

These exercises are interesting but incomplete. In order to obtain an estimate of the optimal size of the currency areas, the other dimensions of the problem should be investigated. In particular, the degree of flexibility of the labour markets does matter, and the microeconomic benefits of the monetary union should be added to the analysis.[5] All this makes it very difficult to obtain reliable estimates of the optimal size of currency unions.

Whereas there is a strong consensus among economists that the EU-28 should not form a monetary union, there is an equally strong conviction that *there is a subset of EU countries that form an optimum currency area*. The minimum set of countries for which a monetary union is optimal is generally believed to include Germany, the Benelux countries, Austria, and France. This conclusion is buttressed by the same empirical studies as those quoted earlier.

Some researchers, however, have tended to enlarge the group of EU countries that would benefit from monetary union; see the studies of Artis and Zhang (1995, 1997). Fidrmuc (2004), Mélitz (2004), and Boeri and Garibaldi (2006) arrive at similar conclusions.

Other empirical studies have cast doubts on the core–periphery view of monetary integration in the EU. Erkel-Rousse and Mélitz (1995) and Canzoneri, Valles, and Vinals (1996) find that in most EU countries monetary policies are powerless to affect real variables such as output and employment. Thus, even if EU countries are confronted with asymmetric shocks, their national monetary policy instruments cannot be used to deal with them effectively. As a result, the loss of these instruments for most of the EU countries is not very costly.[6]

Finally, another series of empirical studies has found that a large part of the asymmetric shocks in the EU countries occurs at the sectoral level and not so much at the national level. Put differently, many of the changes in output and employment in a country are the result of different developments between sectors (e.g. due to demand shifts or differential technological changes). These shocks cannot be dealt with by exchange rate changes (see Bini-Smaghi and Vori 1993; Bayoumi et al. 1995; and Gros 1996).

From this brief overview of empirical studies, it will be clear that it remains very uncertain how large the optimal currency area is in Europe. These empirical studies, however,

[5] Schadler (2004) has an analysis of the degree of flexibility of the labour markets in Central European countries and comes to the conclusion that labour market flexibility may be higher in these countries compared to the Eurozone countries.

[6] For a study of Portugal confirming this, see Costa (1996).

do not seem to undermine our conclusion that the EU-28 as a whole most probably does not constitute an optimum currency area. There is no consensus, however, about the size of the subset of countries that will profit from monetary union. Where should we place the present Eurozone consisting of 19 EU member countries in Fig. 4.4?[7] We have placed this group of countries (Eurozone) above the *OCA* line, but many economists may object to this and would put the Eurozone below the *OCA* line.[8] The recent Eurozone crisis lends some credence to the view that the present Eurozone is not an optimal currency area.

Because of the many difficulties in quantifying the costs of a monetary union, it will remain difficult, however, to obtain clear-cut results in this area. This situation generates ample scope for subjective judgement.

In Fig. 4.4, we have also located the USA above the *OCA* line. We are, of course, not really sure that the USA forms an optimum currency area. We are, however, much less uncertain about the relative positions of the EU and the USA. Note that we have placed the USA at about the same vertical level as the EU-28, expressing the fact that the degree of symmetry between regions in the USA is not much different from the symmetry observed between countries in the EU (see Krugman 1993 on this). The major difference between the USA and the EU seems to be the degree of flexibility of labour markets. Many empirical studies have documented this difference in the degree of flexibility of the labour markets in the USA and in Europe. For example, there is ample evidence that real wages in Europe respond less to unemployment than those in the USA.[9] Similarly, there is ample evidence that labour mobility is much higher within the USA than it is between member countries of the EU.

It should be stressed here that the analysis underlying Fig. 4.4 is based on the traditional theory of optimum currency areas. It does not deal with some of the problems we discussed in Chapter 2. For example, countries may find it difficult, for reasons of credibility, to follow low-inflation policies. The formation of a monetary union may reduce these problems. In addition, some of the asymmetric shocks one observes today in Europe may be the result of the absence of a monetary union. For example, the unsynchronized nature of the business cycle between the Eurozone and the UK may be due to the fact that the UK follows a monetary policy independent of the monetary policies on the continent. If the UK joins EMU these divergences are likely to become less important. As a result, one cannot really be sure that the EU-28 would not gain from a monetary union. Nevertheless, with the present state of our knowledge, it is not unreasonable to maintain our conclusion that the EU-28 may not be an optimum currency area.

The challenge for the EU-28 is to move into the *OCA* zone, i.e. to make a monetary union less costly. How can this be achieved? There are essentially two strategies. One is to reduce the degree of asymmetry of shocks (increase symmetry), and the other is to increase the degree of flexibility.

[7] Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, Spain, and (since 1 January 2015) Lithuania bringing the number of member countries to 19. When the Eurozone started in 1999 with 10 member countries, the present author decided to put the Eurozone above the *OCA* line. Today, with 19 members, he is very much tempted to bring the Eurozone below the *OCA* line.

[8] Many well-known American economists, e.g. Milton Friedman and Martin Feldstein, put the Eurozone below the *OCA* line.

[9] See Grubb et al. (1983) and Bruno and Sachs (1985).