

# Lecture Note on Exchange Rate Regimes, Optimum Currency Areas, and the Euro

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## 1. Fixed versus Floating Exchange Rates

We have studied the effects of fiscal and monetary policy under fixed and floating rates. It remains to discuss the relative advantage of the two regimes.

Advocates of fixed exchange rates make several points.

- *Reduced uncertainty.* Flexible exchange rates make trade more uncertain. Exporters and importers do not know the future values of currencies. Notice that this effect is greater the larger the volume of trade for any country. Of course financial markets have developed institutions to cope with this – futures and forward markets – but these do not eliminate the costs. By eliminating exchange rate risk, it is argued, a country may encourage trade. Evidence on this is mixed, however.
- *Nominal anchor.* A fixed exchange rate can act as an anchor to the price level. This follows from the very inability to conduct an independent monetary policy under fixed rates. Essentially, a fixed exchange rate is providing monetary discipline. The loss of monetary autonomy limits the ability of monetary authorities to pursue excessively expansionary monetary policies. Such a regime can thus be an important signal of policy commitment to achieving low inflation.
  - This is especially important in the context of disinflation. In a high inflation context agents come to expect inflation, and this is a major cause of the costs of disinflation. If agents expect high inflation and monetary policy is tightened, there may be large costs in terms of output

until expectations adjust. A fixed exchange rate may add credibility to a tight monetary policy, and it may help to coordinate expectations that inflation will come down. After all, if exchange rates are fixed, and monetary policy is not tightened, then reserves will quickly run out. Hence, fixing the rate is a commitment to the new policy.<sup>1</sup>

- If countries attach themselves to a large lower inflation country, they can import *price stability*. This is the same argument we have seen before about importing inflation, just standing it on its head. In this case the foreign price level is lower than the domestic price level. This may have been very important for some European countries in their decision to join the EMS. But attachment to Germany could become too expensive if Germany sought excessive tightness (as occurred with German Reunification). EMU solves this problem.
- A fixed exchange rate regime may also limit the ability of the monetary authorities to monetize fiscal deficits. Suppose that the government of a country runs a fiscal deficit. If the central bank monetized the debt this would cause a loss of reserves. Hence, the country cannot continue to both monetize fiscal deficits and maintain the fixed exchange rate.
  - Notice that adopting a fixed exchange rate does not *automatically* instill fiscal discipline. It is *consistent* with it, and it requires it, but it does not *insure* it.<sup>2</sup> That is why we often observe currency crises.

We also know the costs of fixed exchange rates, primarily in the loss of the ability to conduct an independent monetary policy. In addition, a fixed exchange rate may hide the costs of external borrowing. When countries have a flexible exchange rate increased external debt typically causes the currency to depreciate, which raises the cost of external borrowing. But with fixed exchange rates the risk does not show up in prices, and if the government commits to maintain the exchange rate, domestic agents may borrow excessively in foreign markets. There may indeed be an externality here that is not internalized. This is an important point, especially with countries that have recently stabilized, and we will return to this when we get to currency crises.

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<sup>1</sup>This does not always work, of course. It requires that policy actually be consistent with the lower inflation regime.

<sup>2</sup>This is even more true of a currency board.

There is thus a trade-off, and it is important to analyze the nature of this trade-off. This leads us to discuss the theory of optimum currency areas. We turn to that shortly and to the euro in particular. First, we detour to consider the EMS.

### 1.1. Coordination Problem

Often the choice of exchange rate is made as if this is an independent choice. But really it is a collective choice problem.

Krugman's two types of devaluations:

- *bad devaluations*: country has to borrow in foreign currency and cannot service its debt.
- *good devaluation*: Britain in 1931, going off gold. Debts were denominated in pounds, so no spillovers

– really? what about beggar-thy-neighbor effects?

## 2. European Monetary System

In the 1979 the European Monetary System was formed by Germany, France, Italy and other members of the EEC to stabilize their exchange rates. They minimized exchange rate fluctuations among themselves, but floated against the dollar and yen. The idea was to increase economic integration. Initially, France and Italy retained capital controls, so they were not violating the impossible trinity.

This was an adjustable peg system. Each central bank set an exchange rate, and a band around which it could fluctuate. The band was set at  $\mp 2.25\%$  for most member countries (Germany, France, Belgium, Denmark, Ireland, and Netherlands) but Italy was allowed  $\mp 6\%$ , until 1990 when they chose the narrower band. Spain (1989), UK (1990) and Portugal (1992) joined later and chose the wider band.<sup>3</sup> In August of 1993 – after the ERM crisis – the bands were widened to  $\mp 15\%$ . On January 1, 1999 the EMS ceased to exist, replaced by the euro.

The idea of this system is that once the exchange rate reached the limits of the band the Central Banks would intervene. If the franc reached the lower limit relative to the Dmark, then the Central Bank of France and Germany would

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<sup>3</sup>By contrast, the bands set under Bretton Woods was  $\mp 2\%$ .

buy francs and sell DM. The idea was to keep the exchange rate in the band, though there was provision for devaluation if other countries agreed – *realignment*. Realignments were frequent in the early 1980's (ten took place), absent during 1987-1992, and then several occurred during the ERM crisis.

Notice that the size of the band can be important. If the band is narrow compared with potential realignments, it affords the possibility for one-way speculation. If the bands are wider, as the case in Italy, the potential gains are smaller. In fact, Italian realignments relative to the DM were all inside the bands, while this was not true for France.

The EMS was supposed to bring about cooperation between countries and symmetric adjustment. Suppose that speculators move against the franc. The cooperative solution has the CBF and the DCB both buying francs. Hence, the money supply in France contracts and in Germany it expands. German interest rates fall and French rise, to offset the risk of devaluation. But we know that surplus countries are under less incentive to adjust than deficit countries. If Germany does not engage then France must pursue even more contractionary monetary policy. Germany would typically sterilize any inflows to prevent the money supply from increasing. The adjustment was forced on the weaker currency.

Notice that the strongest currency tends to become the leader of the group. Other countries have to follow German monetary policy. Otherwise they have to defend their currencies against the DM. That may be one reason to move to a common currency – to have more say in monetary policy.

By the late 1980's, however, capital controls had been eliminated, and the UK and Spain joined the ERM. Given limited exchange rate flexibility and high capital mobility the ability to pursue independent monetary policy was no longer possible.<sup>4</sup> This became apparent when Germany tightened monetary policy after reunification.<sup>5</sup> Other members of the ERM were not in favor of higher interest rates, but they would have to also tighten if they wanted to stay in the ERM. France and some other members followed suit, giving up their own monetary policy to Germany. Others, like the British, tried to persuade the Germans to relent.

Notice that reunification caused an increase in the price of German goods. To

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<sup>4</sup>France learned this lesson in the early 1980's. The Socialists came to power in 1981 and were set on fiscal and monetary expansion. But capital controls had been greatly reduced, though mobility was still imperfect. The attempt to peg to the DM while pursuing an expansionary policy led to downward pressure on the franc. Capital inflows were insufficient to offset the worsening trade balance. To maintain the peg France had to tighten monetary and fiscal policy.

<sup>5</sup>Monetary reunification had led to an increase in German inflation. The Bundesbank sought to fight this with tight monetary policy.

restore equilibrium, either German inflation had to rise or the rest of Europe's had to fall. The Bundesbank sought the latter, and interest rates increased. This raised the cost, mostly in the form of unemployment, for those pursuing austerity policies to reach Maastricht guidelines. This caused the classic situation of conflict between domestic and external balance. For the benefit of EMU these countries were pursuing austerity at the cost of domestic employment. Willingness to continue with this policy stance clearly depended on the likelihood that EMU would actually come about.

The ratification of the Maastricht Treaty, which created the European Monetary System and the eventual Euro, complicated matters. Danish voters rejected the treaty in 1992,<sup>6</sup> and polls showed that France would likely follow (they didn't, barely). If the treaty was rejected, there would be no reason for countries like Italy to exert dramatic fiscal discipline in order to join EMU. Hence, investors speculated that the ERM would unravel, and started selling the currencies of those countries least appreciative of high interest rates. Italy and the UK were forced to leave the system and let their currencies float, as did Sweden even after letting their overnight interest rates rise to 540% in an attempt to defend their krone.<sup>7</sup> George Soros bet heavily against sterling in this episode, earning the enmity of the Bank of England, and profiting from the investment by more than a billion dollars.

There is a problem with this explanation of the ERM crisis of 1992. This has to do with forward exchange rates. In July of 1992 one year ahead forward rates of the attacked currencies were not outside of their ERM bands. This suggests, perhaps, that fundamentals were not out of line. Indeed, measures of the current account showed UK and France in as good a shape as Germany. Had observers expected a policy shift would not these forward rates have reflected the realignment that was expected?

This suggest that perhaps the crisis was due to a speculative attack. Suppose that a country has a balanced budget and balance in external accounts and is thus happy to maintain current policies indefinitely. Imagine that speculators attack the currency. To defend the peg the authorities raise interest rates to prevent capital outflows. This raises the costs of maintaining the current fiscal policies. The effects on domestic absorption and unemployment may now be excessive compared with the benefits of EMU. The costs of acquiring a reputation

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<sup>6</sup>Although they later reversed that decision in May 1993.

<sup>7</sup>It is estimated that Sweden spent \$26 billion dollars defending the krone in the six days prior to devaluation, on the order of 10% of GDP, or about \$3600 per Swede!

for austerity may no longer be less than the expected benefits. This may make the crisis *self-fulfilling*. This runs counter to the standard theory of currency crises, where attacks are only successful if determined by fundamentals. Notice that the rules of EMU required that the country maintain exchange rate stability to qualify. An attack that causes a devaluation may prevent the country from having the benefits of EMU, so it relents quicker. Even if in the absence of a speculative attack policies were sustainable, the rules for joining EMU may have made speculative attacks more likely. We will return to this topic.

One key factor was that Germany wanted tight money to fight inflation that followed reunification. France and the UK wanted more expansionary policy to combat recession. But with a fixed exchange rate they cannot have an independent monetary policy. It is like a game of chicken. But the speculators made the British blink. This is because to maintain the peg they had to follow policies they did not want to follow, while the Germans did not.

In any event, the result of the ERM crisis was a split among the countries. Those that stayed in the system, like Netherlands, gave up monetary sovereignty. Others, like the UK opted to let their currencies float. For those that stayed in the bands were much widened.

With the introduction of the *euro*, the countries in the system chose to cede monetary sovereignty to the European Central Bank. It remains to be seen, however, whether politicians will be able to live with this arrangement.

### **3. Optimum Currency Areas**

One way to formulate the issue is to ask when it is optimal for a sovereign country to have its own currency. Fixing the exchange rate – the gold standard being the extreme form, although the Euro is also – implies giving up a sovereign currency. What is lost? One thing that is lost is seigniorage. Giving up a sovereign currency eliminates the ability to collect seigniorage. Fixing the exchange rate is less severe: what is lost is the ability to have a different rate of seigniorage from the rest of the world.

This approach – the standard one from Mundell – assumes the benefits of a common currency and asks what are the costs of giving up an independent currency.

There are three main criteria that are typically considered in analysis of optimum currency areas.

### 3.0.1. Common versus national shocks

One reason to have a national currency is to be able to respond differentially to shocks. Of course, it is critical that the shocks have *idiosyncratic* effects. If all the shocks to an economy were common to a group of countries, they would not need independent monetary policy. But this need not be the case.

Consider a country that is divided into two regions, North and South. Suppose that some shock occurs that shifts demand away from North's goods and towards South's goods. This would cause an expansion in the South and contraction in the North, and a trade surplus in the South and a deficit in the North. There are two ways that automatic adjustment can take place:

- wage flexibility
- mobility of labor

To adjust to this shock relative prices (wages) must fall in the North and rise in the South. If wages are sufficiently flexible, then a decrease in Northern real wages will restore the competitive balance between North and South. If wages are relatively inflexible, however, this may result in unemployment.

Even if real wages are inflexible in the North, the resulting unemployment could still lead to adjustment if the unemployed move to the South.

Now if these regions had their own currencies then a depreciation of North's currency against South could offset the effect on  $q$  and thus on incomes in the two countries.

Friedman offered the classic discussion of this issue:

If internal prices were as flexible as exchange rates, it would make little economic difference whether adjustments were brought about by changes in exchange rates or by equivalent changes in internal prices. But this condition is clearly not fulfilled. The exchange rate is potentially flexible...At least in the modern world, internal prices are highly inflexible ("The Case for Flexible Exchange Rates, in *Essays in Positive Economics*).

Friedman went on to offer a famous analogy:

The argument for flexible exchange rates is, strange to say, very nearly identical with the argument for daylight savings time. Isn't it

absurd to change the clock in summer when exactly the same result could be achieved by having each individual change his habits? All that is required is that everyone decide to come to his office an hour earlier, have lunch an hour earlier, etc. But obviously it is much simpler to change the clock that guides all than to have each individual separately change his pattern of reaction to the clock, even though all want to do so. The situation is exactly the same in the exchange market. It is far simpler to allow one price to change, namely, the price of foreign exchange, than to rely upon changes in the multitude of prices that together constitute the internal price structure.

The key issue here is common versus idiosyncratic shocks. Regions that trade a lot with each other may be subject to common shocks. Certainly a common currency will eliminate idiosyncratic monetary shocks. A good example of idiosyncratic shocks was the response to German reunification, which led to increases in German interest rates that were hard for the rest of Europe to cope with.<sup>8</sup>

A related argument is that exchange rate flexibility will only work if firms do not price to market. If they do, then exchange rate changes will effect the real value of incomes, but not the prices of goods. It is easiest to see this in terms of PPP. Let the price of German goods be  $P_G$  and the price of those goods in France be  $\Pi_G$ . PPP implies that  $\Pi_G = \frac{P_G}{e}$ , where  $e$  is the mark price of francs. Suppose that the demand for these goods in France falls. Price rigidity means that  $P_G$  is unresponsive to the demand change unless there is unemployment. But if  $e$  appreciates, then the French price of the good falls right away.

Notice that this assumes that the Germans price their goods independently of where they are sold. If, instead they price to market, then the price in France is independent of the price in Germany. The change in the exchange rate does not change  $\Pi_G$ ; rather it changes the revenue from exports to France. This is an income effect (through profits) but it is smaller than the price effect.

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<sup>8</sup>What was the problem of German monetary unification? Germany almost certainly qualifies as an optimum currency area. The problem was rather the rate at which monetary union was implemented. Productivity in the East was at most one-third of that in the West (probably a quarter). Hence, to make production competitive in the East required that wages be far lower than in the West. If prices were fully flexible then the rate at which *Ostmarks* were converted to *DM* would be irrelevant. But, in fact, wages were not so flexible. Conversion nonetheless took place at one for one. Hence, union caused output and employment to fall in the East, which led to increased government expenditure. This fiscal expansion is what caused the *Bundesbank* to adopt a tight money policy to restrain inflation.



One way to analyze this issue is to consider how entry into a monetary union will affect business cycles. Clearly, it will raise trade linkages. Business cycle patterns will differ after entry. The question is how? Certainly the common monetary policy will change the incidence of monetary shocks. This should detract from idiosyncrasy. What about trade? There are two possibilities.

- Closer trade ties could lead to more specialization and *inter*industry trade. If shocks are primarily supply driven then this could lead to more idiosyncratic cycles (This is the Krugman view)
- Closer trade ties could lead to more *intra*-industry trade. Moreover, if demand shocks are more important than supply, business cycles could become more highly correlated.

So if we examine the relationship between trade integration and divergence, on the standard view there is a negative relationship – more integration leads to less divergence. On the Krugman view it is positive. We call this relationship, *TT*.

While theoretically ambiguous, empirical evidence seems to support the latter view. Frankel and Rose studied the effects of integration on business cycles in 20 industrialized countries over 30 years. They found that greater bilateral trade intensity was associated with higher cross-country correlation in business cycle activity. Greater integration led to more highly synchronized cycles.<sup>9</sup>

The latter finding suggests a Lucas Critique type conclusion. Even if countries appear to have rather idiosyncratic business cycle tendencies this does not mean that they are poor candidates for monetary union. The reason is that joining the union will change behavior, and it may reduce the idiosyncrasy. A country is more likely to satisfy the criteria for entry into a currency union *ex post* than *ex ante*.

**High Degree of Labor Mobility** Now exchange rate flexibility is not the only way to respond to the shock. If factor mobility is high, then labor can move from North to South. This will reduce unemployment in the North, and alleviate shortages in the South. So high factor mobility can substitute for exchange rate flexibility. Think about shocks to the US that relatively hit the Northeast more than the Southwest. The adjustment to these shocks occurred through labor

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<sup>9</sup>Krugman pointed out that production is much more specialized in the US which has an integrated market, than Europe. For example, the auto industry.

moving from the rust belt to the sunbelt. But if labor mobility is low then this avenue of adjustment may be precluded.

Hence, one conclusion from the theory of optimum currency areas is that high labor market flexibility is an important consideration for a monetary union. Interstate labor mobility is quite high in the US, but it is much lower in Europe. There have been moves to speed this, but it is hard to believe that this will be sufficient.

McKinnon has argued, however, that factor mobility may not be necessary nor sufficient condition for a successful union. The key point is that exchange rate flexibility can only affect relative prices if the non-traded goods sector in an economy is large. Suppose that an economy is small and open. Then most goods are traded. Hence, any exchange rate shock is immediately translated into wages and prices. So under these circumstances the exchange rate is not an effective tool for altering relative prices. This suggests that a key criterion may also be the share of output in non-traded goods. If this is low, even an economy with low factor mobility may benefit from a monetary union; at least the cost of eliminating exchange rate flexibility is low.

**Capital Mobility** We talk about labor mobility, but integration also leads to increased capital mobility. People in France will increasingly hold assets in Germany and vice versa. This means that when an adverse shock occurs in France capital may flow to Germany. If labor does not flow then the unemployment situation in France can be even worse than if capital was also immobile.<sup>10</sup>

### 3.1. Model

We can develop a simple model to think about an optimum currency area.

If a country joins a monetary union it gains benefits that are an increasing function of how integrated the country is with the others in the union. We denote this relationship as  $GG$  in figure 3.1. The more integrated a country is the greater the amount of trade and the greater the efficiency gain from having a single currency.

Now we can also plot the losses due to integration. The arguments we have made suggest that this is negatively sloped, as long as the Krugman view is not

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<sup>10</sup>One could also argue, however, that capital mobility forces governments to adopt policies that will further labor mobility to avoid these problems.

correct. Increased integration lessens the role of idiosyncratic shocks. So losses decrease with integration.

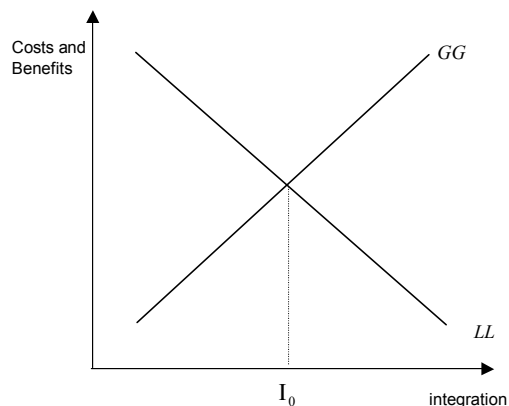


Figure 3.1: Costs and Benefits of Integration

Notice that at the level of integration,  $I_0$ , the costs and benefits of integration are just equal. Were the country more integrated than this it would certainly make sense to join the union as benefits exceed costs. And vice versa.

So figuring out if a group of countries are part of an optimum currency area boils down to assessing the degree of integration and comparing it to  $I_0$ . The problem, of course, is to obtain a quantitative estimate of the the two curves.

### 3.1.1. Fiscal Transfers

A third criteria is the existence of a system of redistributive fiscal transfers. For example, in the US when income in a region falls by one dollar, disposable income falls by 70 cents. The difference is due to Federal government transfers. This cushions the shock across the regions when there are disparate shocks. In theory Europe could do even better, because countries will retain independent fiscal authorities, and so can run deficits and surpluses. But in practice, the mechanisms that are in place are nowhere near as large as in the US.

### **3.1.2. Devaluation Impact**

Notice that devaluation does not have permanent effects on competitiveness. This is, after all, the change in a nominal variable. If demand really shifts in favor of the South, in long-run equilibrium South will have higher real wages compared with North. The key issue is how does the economy get to that new equilibrium. Without devaluation it might take sustained unemployment for real wages to adjust. If adjustment costs are high it may be costly to give up the devaluation instrument.

But notice that exchange rates can also be a source of shocks. And exchange rate policy cannot be used costlessly. Changing the exchange rate affects expectations. The more it is used the more agents protect against its impacts.

### **3.1.3. Political Economy Implications of Integration**

Notice that many of the reasons why adjustment is slow is because countries are still independent. One could argue that more political integration would lower these types of costs (legal and institutional). And one could further argue that monetary integration is a strong commitment device to further more general types of integration.

One could also argue that this type of integration makes it possible to tackle more sensitive issues – such as accession – because it ties countries closer together. Monetary integration will not work without cooperation. If cooperation is achieved other European goals may be achievable.

### **3.1.4. Public Finance Arguments for Monetary Union**

We now turn to alternative motives for a monetary union, what are frequently referred to as public finance arguments.

Recent arguments for maintaining independent currencies versus participation in a common currency area shift the emphasis of the debate away from the role of exchange rates as instruments of output stabilization and instead consider whether a national money can provide a government with an important tool for budgetary finance. One source of finance is seigniorage, often called the inflation tax because it taxes existing holders of money balances. When a country prints money to pay for its expenditures, it generates inflation, lowering the real value of the payments. An important and quite contentious issue in the common currency area literature is that of division of seigniorage rents across participants in the area.

The division of seigniorage rents is the theme of the most recent theoretical studies of currency area participation. However, one can interpret this analysis more broadly, whereby there are distinct patterns of cross-country fiscal transfers and subsidies depending on whether a country remains within or departs from the common currency area.

The desire of a country to secure a (disproportionately) large share of benefits and political influence in a currency union provide the compelling logic behind a country's decision to participate and to submit itself to centralized monetary discipline. In this case, a country may be able to define the minimum amount of political influence or transfers from the rest of the currency area that it requires to ensure participation.<sup>11</sup>

If a common currency area is to be maintained, this system requires a mechanism for coordination and control of monetary emissions by the participating countries. Without such control, participants in the common currency area are able to independently print money (or extend credit) and the union will be characterized by excessive money creation. This inflation bias, noted early in this debate by Buiter and Eaton (1983), arises because each country attempts to print money and export part of the inflation tax to its partners in the common currency area.<sup>12</sup>

To see the role of seigniorage rents, consider a currency union of two countries, one small (with population,  $n_s$ ) and one large (with population,  $n_l$ ). Since both countries are part of a monetary union, inflation in the union depends on total money in the union and union money demand. Hence we can write the inflation rate in the union as:

$$\pi = \frac{r_s n_s + r_l n_l}{m(n_s + n_l)} \quad (3.1)$$

where  $r$  is seigniorage per-capita. The numerator in equation (1) is total money in the union, and the denominator is total money demand, since  $m$  is per-capita money demand.

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<sup>11</sup>Casella (1992) considers the type of transfers required for participation of a large country and small country within a union when there is a negative externality that the currency union is intended to address. The union is viewed as imposing a beneficial discipline on all agents, with deviation costly. The small country participates in the union only if it can receive a relatively favorable share of the seigniorage revenues distributed within the currency area. The large country is willing to participate, up to a point, when it can still gain more from the discipline that the common currency imposes on its partner than it loses in control over domestic policies.

<sup>12</sup>See Canzoneri and Rogers (1990). This result is also noted by Aizenman (1992) and Casella and Feinstein (1989).

In both countries welfare is positively related to seigniorage per-capita,  $r$ , and negatively related to inflation:

$$W = r - \beta\pi^2 \tag{3.2}$$

Hence the optimal inflation rate is given by  $\pi = \frac{r}{2\beta}$ . Notice that when the small country prints money it gets all of the seigniorage revenue, but only a portion of the inflation. In effect, the small country is imposing the inflation tax on the large country's citizens, since they are both using a common currency. But the small country obtains all the revenue. Hence it will try to inflate more than the large country. If the small country was very small, it could assume that increasing its seigniorage has *no* effect on inflation in the union. Suppose it chooses its seigniorage rate taking the other country's rate as given.

It is easy to show that the optimal inflation rate for a country is inversely related to its size. The large country has a lower optimal inflation rate than the small country. Moreover, the difference in these two rates is a function of the difference in size. In effect, the small country is a free rider on the large country. If both CB's are free to print money, the small country will try to print more than the large. Hence coordination is needed. Presumably this problem is solved with a common central bank, as with the ECB.<sup>13</sup>

Another public finance motive in favor of maintaining independent currencies is based on the principle that countries have different optimal inflation rates. This result is drawn from studying the optimal set of taxation instruments available for financing government budget deficits. As applied to the common currency debate, the more asymmetric are countries on their reliance on inflation tax revenues (or, alternatively, the more that countries differ in the difficulty or costs associated with the collection of taxes on goods and services), the more reluctant will be the high inflation country to forego its independent currency (and inflation rate) and enter into a currency union in which it will receive reduced fiscal "benefits" from inflation.<sup>14</sup> From a pure public finance perspective, any common currency constraint that makes the inflation rates of the two countries converge must decrease the income of at least one of the countries.<sup>15</sup>

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<sup>13</sup>But the ruble zone operated as a currency area with multiple central banks. This led to area-wide high inflation. This caused Russia to eventually end the union.

<sup>14</sup>This highlights the revenue effects of inflation but not the efficiency costs.

<sup>15</sup>Inflation can also impact government tax and revenue collection by creating incentives for firms to delay or avoid paying taxes. If tax payments are due after the time that payments are received, higher inflation may make the tax collection system more inefficient and government

The force of this is best seen thinking about optimal inflation rates in Hong Kong and Zimbabwe. Hong Kong is much more developed financially and thus the ability to raise money via the inflation tax is limited by money substitutes. At the same time, other taxes are not as costly in terms of efficiency losses as they are in Zimbabwe where evasion is much greater. Hence, the optimal inflation rates in these two countries differ dramatically, and a currency union would impose large costs on at least one of them.

For Europe, on the other hand, the differences in the optimal inflation rates may be much smaller. Because these economies are relatively similar they ought not have too large differences in optimal inflation rates.

A final economic argument for participating in a common currency – one that is crucial to the push for the EMU – area is that the union may impose a degree of monetary discipline that a government desires but cannot itself commit to. The union is viewed as an enabling mechanism, whereby "weak" central bankers unable to credibly commit to low inflation are able to borrow credibility from the independent central banking authority.

We can formalize this argument a bit. Suppose that output is a function of the difference between inflation, and expected inflation,  $\pi^e$ . In equilibrium, of course, the two are equal, but there may be inflation surprises engineered by the government to increase output. Let the Lucas-type supply curve be  $y = \bar{y} + \gamma(\pi - \pi^e)$ . The loss function can be written as:

$$L = (\pi - \pi^e - \alpha)^2 + \beta\pi^2 \quad (3.3)$$

where  $\alpha$  represents a country's preferences for higher output. Each country wishes to minimize  $L$ . Suppose that it takes expected inflation as given. Then reactions functions look like:

$$\pi = \frac{\alpha}{1 + \beta} + \frac{\pi^e}{1 + \beta} \quad (3.4)$$

which means that the reactions functions are positively sloped (in  $\pi$ - $\pi^e$  space), but the slope is less than one. Notice that the vertical intercept of the reaction function for each country  $i$  is given by  $\pi_i = \frac{\alpha_i}{1 + \beta}$ , where we have assumed that the welfare cost of inflation is equal in both countries.

Now suppose that  $\alpha$  is higher in Italy than in Germany. Then expected inflation in Italy will also be higher than in Germany. We can plot reaction curves for

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financing more difficult. This suggests that, in contrast to the implications of the public finance literature, higher inflation rates may motivate a country to leave the union rather than to remain within it.

Italy and Germany in  $\pi$ - $\pi^e$  space. In equilibrium inflation is equal to expected inflation, so the higher expected inflation in Italy results in higher inflation, but no more output.<sup>16</sup>

The temptation to inflate is evident in figure 3.2 where we plot the Phillips curve and the iso-loss functions for the monetary authorities. We start at point  $A$  with expected inflation equal to  $\pi_1$  and unemployment equal to  $U^*$ , the natural rate. Given the shape of the loss function, however, there is a temptation to inflate. The reason is that the authorities prefer  $U < U^*$  – in other words the peak of the iso-loss curve is left of  $U^*$ . The authorities are better off at point  $B$ . Fooling leads to lower unemployment at a cost of higher inflation that the authorities are willing to accept,  $\pi_2$ . But once agents expect this level of inflation the economy ends up at point  $C$ . Unemployment is no lower but inflation is higher. This is because the authorities are unable to credibly commit to low inflation.

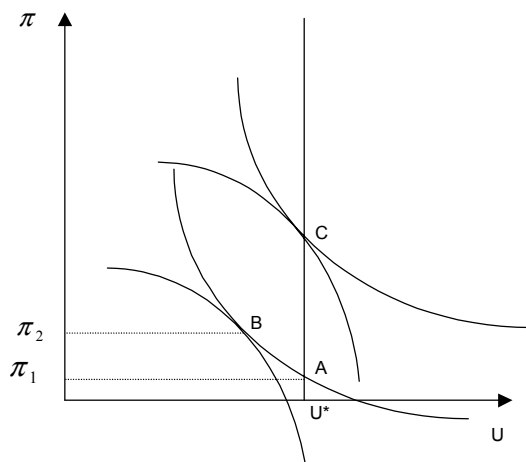


Figure 3.2: Temptation to Inflate

Now suppose that Italy and Germany form a union, Italy forgoes its own monetary policy, and obtains lower German inflation. Since monetary independence does not get higher output anyway, Italy is better off. And Germany is no worse off. The question is why is this not achievable via the EMS? This is important. After all, in the EMS Italy can complain that it is only following Germany, while

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<sup>16</sup>Note that this model is slightly peculiar since there is no gain in equilibrium to higher inflation. But this does not really affect our story.



secretly is quite happy to do so. The problem, however, is that with the EMS type system Italy can always withdraw, and devalue. This creates a risk premium on lire. Credibility of monetary policy is not assured. Compare this to the case with a common currency.

So a monetary union may be needed for Italy to credibly import low inflation. But there may be a problem for Germany. When the common CB of the union is formed the union's monetary policy might be a combination of the two inflation rates, so that Germany loses relative to Italy.

Notice that this is also the case for appointing a conservative central banker. See figure 3.3. Here we have the same Phillips curve – so the same tradeoff between inflation and unemployment – but more "conservative" preferences. The iso-loss curves are flatter. And notice that the equilibrium level of inflation is lower as well. Why, after all, does Germany have lower inflation? It must be because preferences differ. That is the same thing as saying that the iso-loss curves are flatter – it takes a huge fall in unemployment to compensate for even a small increase in inflation. If preferences differ in this way so will the equilibrium level of inflation.

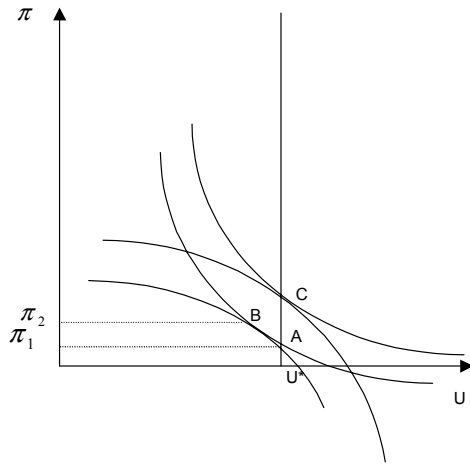


Figure 3.3: A Conservative Central Banker

Now suppose that the ECB has to choose whom to make head of the ECB. It pays to appoint a conservative, one whose preferences toward inflation are tougher than the public's. Why? Because in the face of an adverse shock, they will accept

lesser inflation. This gives a better long-run equilibrium. Of course, you could do even better if the ECB simply valued  $U = U^*$  as the optimum.<sup>17</sup> In that case the ECB only stabilizes when the unemployment rate is really too high. But the problem here is how to estimate  $U^*$ . In any event, by treaty the ECB is to be concerned only with inflation, not unemployment.

There is an alternative interpretation of monetary union, however. It could be that the higher inflation countries wish Germany to pursue a higher inflation rate than it does in the EMS. A European Central Bank will decide monetary policy by voting. Under the EMS it is a German decision. So it could be that a conflict of predictions about the monetary policy of the EMU made possible the decision. France wanted both high integration with Germany and a higher inflation rate. To accomplish this it needed to take the decision out of the hands of the *Bundesbank* alone.

In sum, according to these public finance and revenue-based arguments, a small country should stay within a common currency area if:

1. it is compensated for the welfare losses associated with pursuing suboptimal inflation policies;
2. it can secure a disproportionately high amount of influence in setting monetary policy, or alternatively stated, a relatively large share of the seigniorage or net fiscal transfers; and
3. if it desires to import the credibility associated with the low inflation policies of a dominant central banker.

### **3.1.5. Is Europe an Optimum Currency Area?**

On these criteria Europe does not appear all that suited to a common currency.

- South and North subject to different shocks. Think of Ireland versus France
- Not enough Fiscal Federalism
- Labor mobility is too low
- Product markets are not highly integrated

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<sup>17</sup>De Grauwe calls this "target" as opposed to "weight" conservatism.

But there are some considerations that may change this conclusion. First, greater trade and interdependence results in greater cohesion in business cycles. Greater interdependence may reduce the result of idiosyncratic shocks. This could lead to more common shocks than prior to EMU. More political unification can lead to greater factor mobility.

Second, EMU may improve the balance in favor of structural reforms. Before EMU monetary policy and/or exchange rate policy may be used to delay structural market reforms. With EMU these instruments are not available, and even fiscal policy is greatly constrained by the *Growth and Stability Pact* which limits fiscal autonomy. Hence, structural reforms which have been delayed may be implemented. This could increase the flow of goods and factors across Europe.

But all of this probably requires greater political union. After all, the US monetary union works because we have a strong central government, and significant impediments to cross (state-) border flows are limited.

### **3.1.6. Stability Pact**

Notice that EMU requires some coordination of policies across countries. To join, the Treaty defined convergence of macroeconomic policy as:

1. the country's inflation rate does not exceed the average of the lowest 3 member country rates by more than 1.5%;
2. its interest rate on long-term government bonds does not exceed those of the 3 lowest-inflation members by more than 2 percentage points; and
3. the country's government budget deficit does not exceed 3 percent of GDP, and outstanding government debt does not exceed 60% of GDP.

These are the "membership fees" required for EMU. Some, like Italy, have paid a large price to get in. Others, like Greece, have not been able to pay. This is definitely the sticky issue for new members from Central Europe.

Notice that these criteria were not absolutely necessary for EMU. The problem, however, is that if countries enter EMU with high debt levels there will be greater pressure to have higher inflation rates. The optimal inflation rate is a function of the debt level. So if Germany wants to keep the ECB from choosing high inflation it needs to insure that there are appropriate membership criteria. An entry fee, so to speak, consisting of low debt, deficits, and inflation.

**The Stability Pact: Importance of Fiscal Constraints** It is important to notice that these conditions limit the usefulness of fiscal policy. Given that members are giving up the chance to use monetary policy to cope with idiosyncratic shocks, fiscal policy remains a vital tool. With fixed exchange rates, fiscal policy could be effective at dealing with shocks to individual countries. Why then does the Stability Pact limit their use?

The essential reason is *sustainability*. In the Mundell-Fleming model any point on the *BB* curve represents external balance. In this case fiscal policy can be used as a stabilizer. Suppose that France suffers an adverse demand shock. France could run a budget deficit to offset the impact on aggregate demand. German savings could finance these deficits. The fiscal deficit would also lead to a current account deficit, which would be financed by an inflow of capital from Germany. This would enable adjustment without exchange rate depreciation. Of course if there were centralized budgets in the union this would happen automatically, as in the US.<sup>18</sup> But even without it, fiscal expansion can solve the problem.

- since monetary union eliminates monetary policy fiscal policy should be used as a policy instrument

But this is a *short-run* analysis. It neglects the issue of financing of deficits, and their *sustainability*.

For longer periods it is important to remember that the present value of the current account must sum to zero. Sustained fiscal deficits may have long run consequences for maintaining the value of the currency. Notice the emphasis on sustained. If deficits are simply transitory events then they would wash out. But if fiscal deficits, and the associated current account deficits, are sustained, or expected to be so, this will reduce competitiveness and require some eventual adjustment. Sustained deficits lead to large debts that must be financed. This has a negative feedback effect as higher interest rates make the debt grow faster, perhaps faster than GDP. Investors that observe an unsustainable fiscal situation expect that some fundamental adjustment will occur – perhaps they may expect that the currency will eventually depreciate.<sup>19</sup> In a floating exchange rate regime the adjustment to sustained current account deficits would be exchange rate de-

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<sup>18</sup>Although with this there is always the problem that some regions become dependent on fiscal transfers, i.e., southern Italy.

<sup>19</sup>Notice that this expectation will put pressure on the value of the currency today, a point we will return to.

preciation. The deficits may eventually be (partially) monetized. This would mean that the currency will eventually be depreciated.

Depreciation can be the end result for an economy with fixed exchange rates, but for a country in a currency union this cannot happen. A country in a monetary union cannot depreciate its currency – it doesn't have one. And it cannot monetize deficits because it does not have an independent central bank. How then is the analysis altered? First, note that one potential effect is for a negative spillover. The growing debt in the union as a whole raises interest rates in the union. This puts pressure on other countries. It will also reduce the flexibility of monetary policy in the union.

The key point here is to note that there are three paths of adjustment:

- drop out of the union and have higher inflation
- default on the debt; or,
- faster monetary growth in the union as a whole to monetize the debt.

The reason for the latter is the simple point that higher debt levels mean higher optimal levels of inflation. Some of the real value of the debt can be reduced by higher inflation, and the inflation tax can be used to make up the fiscal gap. But notice that there is an additional problem here: coordination across a group of countries. This leads to a free rider problem.

There is a problem with this analysis, however. If Italy runs large deficits it is not clear that interest rates in the EMU as whole should rise. Why not just Italian interest rates? If capital markets are well integrated and *efficient*, why shouldn't Italian rates rise relative to German? Note that Italy and Germany borrow in the same currency. There is no currency risk. If interest rates differ there will be arbitrage possibilities unless there is default risk. But if there are differences in default risk a risk premium can occur.

But why cannot a risk premium be attached only to the Italian securities? Shouldn't lenders be able to figure this out? In that case it is only Italian interest rates that rise. But there is a *moral hazard* problem to worry about. Can the rest of the union commit not to bail out Italy? They can make such a claim, but is it credible? If Italy's problems get too severe, the other countries may not be able to stand by and watch. It is not really clear how a debt default of a euro-zone member could occur; it seems almost impossible to contemplate.<sup>20</sup> If investors

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<sup>20</sup>One could argue, however, that default is less likely in a EU member country than in a US state. The former has vast taxing power while this is much more limited in the US, or Argentina.

anticipate this there will be a rush to buy Italian bonds, and there will be no risk premium. Instead euro-zone rates will rise and Italian deficits will spillover to the union.

There is a counterforce to consider. Without the possibility of monetizing deficits the budget constraint that member countries face is harder than it would otherwise be. Perhaps this offsets the moral hazard problem. Moreover, if Italy were to default via depreciation outside the union the other EU countries would face a competitive disadvantage – they may bail out Italy to prevent this. But if Italy is inside it cannot inflate away, so perhaps the incentive to default is smaller. Whether it does is an empirical question.

So far interest differentials have not gone away – so there is no pure moral hazard. See, figure 3.4 where we have interest differentials before and after the euro. Notice that before there was currency and default risk, but in 1999 there is only default risk. Notice that differentials declined, but not to zero. And some reason for the decline is that Italy got its fiscal house in order to join. So differentials can persist. This suggests that moral hazard is not over-powering.

	<u>March 1996</u>		<u>August 1999</u>
	<u>in national currencies</u>	<u>in common currencies</u>	<u>in euros</u>
Guilder	4	5	15
French franc	37	21	11
Belgian franc	50	27	30
Peseta	347	30	26
Lira	444	81	29

Figure 3.4: Interest Differentials with Germany (ten year bonds), in basis points. Source de Grauwe, p. 209.

But before we give up all together on this we should note that these differentials fell *within* the regime of the stability pact. What if there were no stability pact? Consider the plight of Portugal now. Its debt has grown rapidly due to the current account deficits it has experienced. It now faces painful adjustments because of the stability pact. But if the latter were not in existence would Portugal be adjusting now? Or would it get even further into trouble and have to adjust down the road and face Argentina-like problems?

If fiscal policy were conducted so that there were no structural deficits, only

cyclical ones, then fiscal stabilizers could operate to moderate recessions. The question is how responsible governments will be in absence of a rule like the stability pact? In the US there are strong constraints on provincial borrowing. In Argentina there were not and the provinces bankrupted the union. How much pain should the euro-zone accept?

### 3.2. Political Aspects of EMU

Even if the economic arguments are insufficient for EMU there may be political aspects that are crucial. Three points are relevant.

- EMU can be a precursor to political union and other important goals
  - cooperation on this front could generate cooperation on a more radical step of political union, if that is desired
  - even if there are narrow economic pressures, countries will not drop out because they want to achieve further cooperative goals
  - further cooperative goals thus induce greater monetary cooperation, making EMU more feasible
- Linkage politics
  - E.G., Why would Germany accept the ECB if it is likely to be less anti-inflationary than the Bundesbank?
    - \* to gain acceptance of German reunification without revision of the Treaty of Rome,
    - \* and to gain support for eastern accession
- Convergence criteria *before* EMU could create more anti-inflationary regimes in Europe. This reduces the pressure on the Bundesbank.

### 3.3. Effects of Currency Union on Trade

Recently there has been a debate about the impact of a currency union on trade. How large should we expect trade to grow? This is an important question. If the answer is large then the benefits of the union may be greater. It surely would help make business cycles more cohesive.

It turns out that the empirical estimates that economists have recently made result in amazingly large effects [2], and thus it is worth discussing.

The basic idea is to use past data on trade between countries that had a common currency and compare them with those that don't. Of course, it is not that simple, however. First, there may be reasons why some countries have a common currency that also promote trade between them. This must be controlled for. Second, we can distinguish between two types of questions to ask:

- “How much more do countries within currency unions trade than non-members?”
- “What is the trade effect of a country joining (or leaving) a currency union?”

The latter question is the time series question, and it is the more interesting question. The former is the cross section question but it is problematic due to sample selection issues. Of course, which question we can ask depends on the data.

In [1] a data set that covers 50 postwar years is used that includes over 100 country-pairs that dissolved currency links. They compare before and after effects on trade.

The basic approach is the gravity model. This model states that The latter states that trade between a pair of countries is proportional to their combined incomes, and inversely proportional to the distance between them. It is widely used in empirical work on trade. Specifically, consider the following equation:

$$\begin{aligned}
 \ln(X_{ijt}) = & \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j)_t + \beta_3 \ln D_{ij} + \beta_4 Lang_{ij} \\
 & + \beta_5 Cont_{ij} + \beta_6 FTA_{ijt} + \beta_7 Landl_{ij} + \beta_8 Island_{ij} \\
 & + \beta_9 \ln(Area_i Area_j) + \beta_{10} ComCol_{ij} + \beta_{11} CurCol_{ijt} \\
 & + \beta_{12} Colony_{ij} + \beta_{13} ComNat_{ij} + \gamma CU_{ijt} + \epsilon_{ijt}
 \end{aligned} \tag{3.5}$$

where  $i$  and  $j$  denotes countries,  $t$  denotes time, and the variables are defined as:

- $X_{ijt}$  denotes the average value of real bilateral trade between  $i$  and  $j$  at time  $t$ ,
- $Y$  is real GDP,  $Pop$  is population,  $D$  is the distance between  $i$  and  $j$ ,
- $Lang$  is a binary variable which is unity if  $i$  and  $j$  have a common language,



- *Cont* is a binary variable which is unity if *i* and *j* share a land border,
- *FTA* is a binary variable which is unity if *i* and *j* belong to the same regional trade agreement,
- *Landl* is the number of landlocked countries in the country-pair (0, 1, or 2).
- *Island* is the number of island nations in the pair (0, 1, or 2),
- *Area* is the land mass of the country,
- *ComCol* is a binary variable which is unity if *i* and *j* were ever colonies after 1945 with the same colonizer,
- *CurCol* is a binary variable which is unity if *i* and *j* are colonies at time *t*,
- *Colony* is a binary variable which is unity if *i* ever colonized *j* or vice versa,
- *ComNat* is a binary variable which is unity if *i* and *j* remained part of the same nation during the sample (e.g., France and Guadeloupe, or the UK and Bermuda),
- *CU* is a binary variable which is unity if *i* and *j* use the same currency at time *t*,
- $\beta$  is a vector of nuisance coefficients, and
- $\epsilon_{ij}$  represents the myriad other influences on bilateral exports, assumed to be well behaved.

Notice that the coefficient of interest is  $\gamma$ , the impact of being in a currency union on bilateral trade.

They use the “Direction of Trade” (DoT) data set developed by the International Monetary Fund (IMF). This data set covers bilateral trade between 217 IMF country codes between 1948 and 1997 (with many gaps).<sup>21</sup>

What do they mean by a currency union? By “currency union” we mean essentially that money was interchangeable between the two countries at a 1:1 par for an extended period of time, so that there was no need to convert prices when

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<sup>21</sup>Not all of the areas covered are countries in the conventional sense of the word; colonies (e.g., Bermuda), territories (e.g., Guam), overseas departments (e.g., Guadeloupe), countries that gained their independence (e.g., Guinea-Bissau), and so forth are all included.

trading between a pair of countries. Hard fixes (such as those of Hong Kong, Estonia, or Denmark) do not qualify as currency unions under this definition. During the sample there were 16 switches into and 130 switches out of currency unions (for which we have data). There are a number of foibles with these regime switches. First, since there are not many observations on currency union entries, they are forced to treat exits from and entries into currency unions symmetrically. Second, some of the transitions were related (e.g., Bermuda’s switch from the pound sterling to the American dollar), and a number are cross-sectionally dependent (e.g., Equatorial Guinea entered the CFA franc zone and so joined a currency union vis-à-vis many countries simultaneously). But while there are not 146 independent observations on regime transitions, the number is still substantive.

Using this basic model they estimate  $\gamma$  to be 1.3, which means that trade increases over three times ( $e^{1.3} \simeq 3.7$ ) if you are in a currency union. This is pretty big. Of course this estimate combines the cross section and time series. The best thing to do is to use the fixed effect “within” estimator. This exploits the panel nature of the data set without making heroic assumptions. It estimates  $\gamma$  by comparing trade for a pair of countries before CU creation/dissolution to trade for the same pair of countries after CU creation/dissolution. This within estimator exploits variation over time, and it answers the policy question of interest, namely the (time series) question “What is the trade effect of a country joining (or leaving) a currency union?”

The fixed effects estimate of  $\gamma$  is smaller than the OLS estimates around 0.65. Since  $e^{0.65} \simeq 1.9$ , the estimate implies that joining a currency union leads bilateral trade to rise by about 90%, i.e., *almost double*. This effect is economically large, and statistically significant at conventional levels.<sup>22</sup>

### 3.3.1. Caveats

There are caveats to consider. For example, as the sample ends before EMU, most of the currency unions involved countries that were either small, poor, or both; the results may therefore be inapplicable to EMU. Another problem could be endogeneity. The estimation assumes that *CU* is exogenous. But it could be that countries join currency unions to increase trade. This seems doubtful, but it is at least possible. Many of the pairs were colonies for example.

The big problem, of course, is sample selection. The countries in CU pairs are not randomly selected. It could be that trading costs are lower for these countries

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<sup>22</sup>The *t*-statistic is 13.

than for others.

The one serious case in his sample is the dissolution of the Anglo-Irish currency union when Ireland joined the EMS (way before Britain did). Trade between the two did not fall very much at all, so the currency union did not make much difference in that case.

### 3.4. Some Transition Issues

There are a few interesting transition issues with regard to the EMU.

Economic history offers no precedent for the conversion of the individual European currencies to the euro, nor for the dual-currency system that will briefly operate after the switch. Some 14.3 billion euro notes and 50.6 billion euro coins will have to be put into circulation, and a roughly equivalent amount of existing currency will have to be withdrawn soon thereafter. The logistics are horrendous.

- If Germany's stock of 4.3 billion euro notes were stacked up in a single pile, it would be 50 times higher than Mount Everest.
- The weight of all new euro coins is a staggering 239,000 tons, equivalent to 24 Eiffel towers.
- To distribute the cash in a single day would require a fleet of 478,000 vans.

Not all countries will replace currency on the same date, even though it comes into effect on January 1. In Germany, only the euro will be legal tender right from the start, but retailers and banks will accept D-marks until the end of February. In the Netherlands, the two currencies will coexist for 28 days before the guilder ceases to be legal tender. In France the dual-currency period runs until February 17th, and in Finland, Spain and Italy until February 28th. Geography will also play a part in how quickly the new currency will come into full circulation. Finland, for example, with many relatively isolated towns and villages, will take longer to get the new currency into tills and cash machines than more urbanized countries.

Retailers will pay a high cost of the conversion. They have to have both currencies on hand. Big companies have to change their IT systems, but that is less costly, they probably do that regularly anyway. Retailers will be receiving both currency and euro but they must give change only in euro. So their cash holdings will rise a lot. These are still only temporary costs.

Interesting problem arise with prices.

- the typical contribution to the collection plate at a Sunday service in France is FFr10, in the convenient form of a single coin. After January 1st, there will be two convenient coins to choose from. If all worshippers reach for euro1, the church's takings will drop by a disastrous 35%. If they all hand out euro2, the church's income will increase by a third, which may be too much to hope for. Prayers are now going up that at least every euro1 coin will be matched by the euro2 sort, so that the net effect will be minimal.
- There have already been subtle price changes to reflect the euro's imminent arrival. For instance, in Paris the price of a single espresso coffee for consumption at the bar was FFr6 for years. Over the summer months, the price quietly rose to FFr6.50, a sum that can be conveniently rounded to euro1. For the bar owner, the neat euro price will make life easier after January 1st. For the consumer, it means he simply pays more for the same coffee.
- coin operated dispensers pose problem. To get to a round euro coin you may have to raise the price or change the amount
- Spanish companies, for their part, face a challenge known as the "disappearing peseta". This arises in businesses using lots of small components that need to be priced separately in order to assign costs fairly to their suppliers. For instance, a cleaning-products company might use a colourant that accounts for a tiny proportion of a total product, costing perhaps as little as 0.001 of a peseta. Or an ironmonger might stock washers that cost 1.37 pesetas each. These amounts are so small that they generate almost meaningless prices when converted into euro and then rounded to two decimal places. Here is how the peseta disappears. An item that costs 0.84 pesetas converts to euro0.005048, an amount that rounds up to euro0.01. But an item that costs 0.83 pesetas converts to euro0.004988. Rounded, this becomes zero.
  - This is not a theoretical nicety, but a real issue for businesses. The ironmonger's washers, for example, convert to euro0.00820359 each. If they are sold by the thousand, that makes euro8.20. But the individual price must be rounded to euro0.01, which pushes the price per thousand up to euro10, almost 22% higher. To avoid such distortions, the company's systems must be set to do rounding calculations only at the end of its accounting processes and not at the intermediate stages.

- The price of 9.99 guilders becomes euro4.53, which, converted back again, becomes 9.98 guilders. Most consumers would find that thoroughly confusing. From a retailer's perspective, euro4.53 is an unattractive price because it requires at least four coins in change, and possibly notes as well. A price of euro4.49 makes more sense, but produces less revenue.
- Price dispersion. The euro will reveal that prices are dispersed across the EU. For example, the European edition of the Guardian, a British newspaper, the price within the euro zone differ substantially – in Greece and Portugal pay euro1.67, in France euro2.13 and in Finland and the Netherlands as much as euro2.61. Before euro prices, such price differentials were hard to spot. Now they are glaring. A kilo of beef cost euro15 in Paris, euro21 in Amsterdam and euro9.90 in Madrid. A visit to the cinema in Dublin or Brussels cost euro8, but in Athens you paid only euro5.90 to see the same film. A 5-kilo jumbo pack of washing powder cost euro9.80 in Brussels, but an extortionate euro24.30 in Helsinki. And a packet of proprietary aspirin cost euro3.70 in Athens, but euro12.90 in Rome and Berlin.
  - with independent currencies these price differences are hard to spot, in a common currency union they will lead to arbitrage presumably. Price levels could rise faster in countries with lower initial price levels, so there is convergence. Or will arbitrage be deflationary?
- Although there has been some success in a European bond market, less integration with equities. Countries are reluctant to eschew restrictions on securities trading that could cause trading to move to a center. Also, it is not clear how bankruptcy would work in a pan-European sense. That is why in the US we have national bankruptcy laws.

## 4. Currency Boards

An alternative way to obtain monetary credibility than joining a common currency area is to adopt a currency board. This has recently become more popular. If a country is not part of a optimum currency area monetary union may be too costly. For such countries a currency board may be a promising alternative. Recently Argentina, Bulgaria, Estonia, Hong Kong and other countries have adopted a

currency board, and it has been discussed in cases such as Indonesia and Russia.<sup>23</sup>

What is the key difference between a fixed exchange rate and a currency board? Both peg the value of the currency. But a currency board is a much more rigid form. The essential feature of a currency board is a legal requirement to back the domestic currency 100% by foreign reserves. For example, suppose that Estonia establishes a currency board by fixing the value of the kroon to the DM. Suppose the rate is 8 to 1. Then the central bank of Estonia must hold foreign reserves equal to  $\frac{1}{8}$  of the domestic money supply. Any inflow of reserves automatically results in an increase in the domestic money supply, and an outflow results in a decrease.<sup>24</sup>

It is important to emphasize that a currency board holds reserves sufficient to back the monetary base. That is, it holds reserves of foreign currency equal to at least 100% of base money. Thus the currency board does not back bank deposits.<sup>25</sup> In practice currency boards usually hold a good portion of their reserves in interest-bearing assets such as T-bills of the country that the currency is tied to.

Notice that with a currency board the balance sheet of the Central Bank does not contain domestic securities. The assets it holds are foreign currency and interest-bearing assets. This is what adds credibility: the currency board cannot advance credit to the government.

What if there is a shortage of liquidity in the banking system? This could happen because the currency board cannot run an expansionary monetary policy. If the currency board is credible this is no problem. Commercial banks borrow foreign currency and then exchange this for domestic currency at the currency board. The currency board uses this to buy foreign interest-bearing assets anyway. So the cost to society is the difference in the interest rates paid by the commercial banks and that earned by the currency board.

The problem for a currency board arises when commercial banks *cannot* borrow in external markets. If depreciation is expected or there is a banking crisis, then foreign investors may not lend. In that case the only way to increase liquidity

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<sup>23</sup>Russia had, in fact, one of the first currency boards during the Civil War. In the territories held by the Whites, a currency board was set up, by none other than John Maynard Keynes. It had a remarkably successful record of restraining inflation in this region despite the havoc of civil war.

<sup>24</sup>Hence, the key difference advantage of the currency board versus a standard fixed exchange rate, is that in the former case the country cannot run out of reserves to maintain the peg. With 100% reserves the peg is fully sustainable. Of course, the money supply could shrink indefinitely.

<sup>25</sup>Hence it cannot be a lender of last resort.

is for the government to borrow externally. But in a currency crisis government typically are faced with similar constraints on borrowing. This suggests that a currency board will work best in a country with a well-functioning financial system.<sup>26</sup>

With a currency board the Central Bank abandons the capacity to conduct independent monetary policy by law. Does this mean that the money supply is inelastic with respect to money demand? No. The money supply can respond because foreign reserves can be *earned*. Suppose that money demand increases. This shifts the LM curve to the left, raising interest rates and causing a surplus in the balance of payments (capital inflows increase and the current account balance improves).<sup>27</sup> This causes an excess demand for domestic currency which translates into a higher monetary base because of the fixed exchange rate.

In a fixed exchange rate regime there is always the possibility that if the currency comes under sufficient attack the Central Bank will abandon the peg. With a currency board this possibility is greatly reduced since it requires an act of law. Laws of course can also be broken. Notice that a currency board does not guarantee credibility. What if the country runs an irresponsible fiscal policy? This will crowd out net exports and result in a decline in the domestic money supply. If prices were flexible, the effect on competitiveness could be offset. But if prices are rigid downward, then the resulting contraction of the money supply may cause unemployment. Maintenance of the currency board may require unacceptably high levels of unemployment. Suppose that once unemployment increases speculators believe that the currency board will be changed. Then they may speculate against the currency. This will further reduce the domestic money supply (capital outflows) and put the country under greater pressure. If the government is very weak it may just change the currency board law.<sup>28</sup>

This suggests that the credibility of a currency board derives from the differ-

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<sup>26</sup> Adopting a currency board in post-crisis Russia or Indonesia is likely to be folly. The reserves of the board are likely to be siphoned off by the powerful, who will obtain foreign currency before the system collapses. Notice that it also requires a large transfer of aid so that the currency board can back base money 100%.

<sup>27</sup> Notice that even without investors responding, commercial banks may respond to increased demand for credit by borrowing foreign currency. This can then be exchanged at the currency board for domestic money. Similar to the process whereby banks add to their liquidity.

<sup>28</sup> This is why President Menem is now considering adopting the dollar. This means that Argentina becomes part of the dollar area. It has already given up independent monetary policy, so the costs are low. But the credibility is even greater. There is no domestic currency to bet against!

ence between law and policy. If it is hard to change laws, and if a country respects them, then a currency board may add credibility. In a country with rampant corruption, however, the credibility achieved from a currency board may be greatly reduced.

Presumably if the currency board produces sufficient credibility, then the contraction of the money supply caused by expansionary fiscal policy will be offset by a capital inflow. But what if speculators believe that the currency board law will be rescinded? In the wake of the Mexico crisis and again recently with Brazil, investors started to doubt Argentina's ability to maintain the board. In fact, Argentina was successful.

One cost of having a currency board is that the Central Bank can no longer act as a lender of last resort; at least not in the standard way. Because of the 100% backing of the currency, the central bank cannot create credit to lend to banks in distress in the wake of a banking crisis. It is possible, of course, for the fiscal authorities to lend to banks in distress, but this is a much more cumbersome process.

## References

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