

Hefeker, Carsten

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GMU, EMU, and the Bundesbank: The political economy of recent EMS-crises

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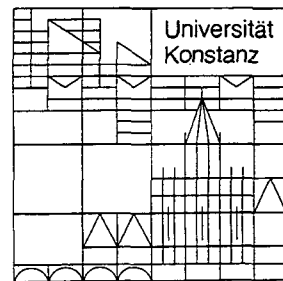
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Sonderforschungsbereich 178
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Diskussionsbeiträge



Juristische
Fakultät

Fakultät für Wirtschafts-
wissenschaften und Statistik

Carsten Hefeker

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Postfach 5560
D-78434 Konstanz

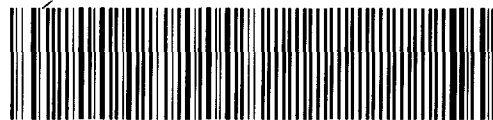
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G M U, E M U, and the Bundesbank:
The Political Economy of Recent E M S - Crises*

Carsten Hefeker

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Abstract:

The most recent wave of political integration in Europe is usually interpreted to represent a consequence of German unification, following which the other EU countries attempted to contain an imputed threat of the change in the European balance of power. This paper shows that German unification may well have also had adverse effects on European integration by arguing that the breakdown of the EMS was due to the well-calculated monetary policy of the Bundesbank with the silent consent of the German government in the course of German Monetary Unification.

The recent collapse of the "new" EMS for now marks the end of the movement towards European Monetary Union (EMU). The decision to adopt a 30 percent corridor around the bilateral target rate constitutes a step backwards on the way towards full monetary union envisaged in the Maastricht treaty. It thus ends the "Maastricht Way to EMU" (Fратиanni et al., 1992). Following a time without realignments in the five years preceding September 1992, with the removal of capital controls and with new entrants into the ERM, how can this sudden shift be explained?

The scarce literature on this question identifies several reasons for the occurrence of the September 1992 crisis and the final collapse of the EMS in July of 1993. Portes (1993) identifies the large idiosyncratic shock of German unification as causal. The "inconsistent trio" of stable exchange rates, independent monetary policy and free capital movements caused the collapse of the EMS, as the Bundesbank had to tighten monetary policy in reaction to excessive German government spending following unification, while the other EMS countries were unwilling to follow or to devalue. Eichengreen and Wyplosz (1993) and Vaubel (1993) stress the role of the Maastricht treaty in this context. Eichengreen and Wyplosz see the treaty inducing rational balance of payments crises, causing the collapse. Vaubel mentions, among other reasons, the Bundesbank's reaction to the treaty.

Where the literature and the Bundesbank itself usually assign only a passive role to the Bundesbank, this paper instead focuses on the active role of the Bundesbank. Here it is suggested that the Bundesbank's self-interests are decisive for the collapse of the EMS. Two reasons caused the Bundesbank's behavior, the two crises and the collapse of the ERM and the EMS.¹ One reason is the non-cooperative game between the German Bundesbank and the German government resulting from the process of German monetary union (GMU). The chosen exchange rate between deutschmark (DM) and ostmark in the course of German unification marked the starting point of this conflict. The Bundesbank had to accept a different rate of conversion than it had proposed and suffered a major loss in its reputation as independent central bank *vis-à-vis* the

¹ Although not entirely correct, I use the terms ERM and EMS interchangeably when referring to their collapse. The ERM is, among the ECU and credit provisions, only part of the EMS. Moreover, the Greek drachma was not included in the ERM. See Frатиanni and von Hagen (1992) for details.

German public and the EMS partners. Subsequent expansionary fiscal policy adopted by the government only aggravated this conflict, being countered with tight monetary policy. Given the dominant role of the Bundesbank in the EMS and the constraints for independent monetary policy in the ERM, the tight German monetary policy spilled over into other ERM countries, forcing them to tighten monetary policy as well. While the European countries first profited from the export boom caused by German unification, with the upcoming recession the European governments were no longer able to defend the exchange rate by raising interest rates. The trade-off between the benefits of stable exchange rates and the costs of reduced monetary autonomy became steeper and it became more costly to trade the benefits of stable exchange rates later for reduced autonomy and unemployment now (Hamada, 1977).

Following the real shock of the German unification all observers were certain that the DM needed to revalue to attract the necessary capital and to have the external deficit needed to rebuild East Germany. However France, as the major adversary of the Bundesbank, was unwilling to devalue its currency against the DM. Having adopted a policy of competitive disinflation in the second half of the 1980s, France now wanted to receive the benefits of a low inflation rate, and also the prestige from having a more stable currency than Germany, hoping to become gradually the new "anchor" of the system. Hence, a devaluation against the DM was ruled out (Portes, 1993). When markets finally expected that politicians in ERM countries were no longer able to defend the exchange rate for domestic reasons, the sure one-way speculation resulted in too high a pressure to resist, magnified by the Bundesbank's reluctance to intervene and stabilize the exchange rate. Nearly one year earlier than France, Italy and Britain could no longer stand the incompatibility between domestic pressure and external prestige because of the lower EMS concerns in these countries.

The second reason for the EMS collapse can be seen in the Maastricht treaty itself. The treaty is often interpreted as stemming from German unification and signaling German commitment to the European unification process (Garrett, 1993; Sandholtz, 1993). According to this view, by accepting a specific date for monetary union, Germany surrendered monetary autonomy as the price for the European countries', especially France's, approval to German unification. The treaty, by fixing the date when the Bundesbank would lose independence and thus

the leading role in Europe, I argue instead, prompted the Bundesbank to set monetary policy even tighter than it might otherwise had done. A relatively restrictive policy was regarded as a possibility to stop the movement towards EMU. Growing domestic pressures in the partner countries signaled that sooner or later, given recession and rising unemployment in Europe, the other countries might no longer be able to defend their exchange rate *vis-à-vis* the DM. The German governments' excessive fiscal spending, in this perspective, only gave the Bundesbank a reason to block EMU after the Maastricht treaty had been signed. Thus, the treaty, seen as a German commitment to EU, actually triggered the shattering of EMU.

The paper proceeds as follows. In Section 1, I briefly describe the EMU before GMU and the French policy of competitive disinflation. In Section 2, the GMU shock and the resulting non-cooperative game between the German government and the Bundesbank are depicted. In Section 3, the external dimension of GMU and the export boom is highlighted. I then turn to the two crises of the EMS. The next section presents a model on the above considerations. The final section offers some concluding comments.

1. The EMS Constraint and Competitive Disinflation in France

In the first four years of the EMS, exchange rates were realigned seven times as national monetary policies and inflation rates still diverged considerably. Thereafter, in 1983 the French socialist government made two important economic decisions: it decided to stay in the EMS and consequently to change the course of macroeconomic policy, particularly in abolishing the system of wage indexation. Full employment was no longer sought by stimulating demand with monetary and fiscal policy, but by increasing international competitiveness. Under fixed exchange rates this required a monetary policy at least as restrictive as that of the major trading partners, as only this could avoid a real appreciation of the French franc. Eventually, according to this reasoning, the country might even be able to keep its own rate of inflation below that of its trading partners, having then the benefits of a competitiveness advantage.

Although this policy mix brought about adjustment costs for the French economy because there were initial credibility problems of this policy shift, it was not changed afterwards (Fitoussi et al., 1993). In contrast, it became a dominant issue in French economic policy. Why this sudden

French policy turn occurred is not clear. One frequently voiced suggestion is that the costs of inflation were increasingly viewed as being large and that a consensus to lower the rate of inflation developed (Collins and Giavazzi, 1992; Sandholtz, 1993). This approach also stresses the function of the EMS as a disciplinary device because it fosters discipline concerning wage-setting behavior (Blanchard and Muet, 1993). Another argument for fixed exchange rates had always been the European Common Agricultural Policy (CAP) (Giavazzi and Giovannini, 1989). Due to the CAP, each exchange rate change results directly in a change in the domestic prices for agricultural products (which are expressed in ECU) thereby changing production incentives. The powerful lobby of agricultural interests in the EC countries has thus always pushed for fixed exchange rates.

Regardless of why it was adopted, the French strategy was largely successful. Inflation in France dropped (supported by the fall in oil prices) between 1983 and 1986 and has since then been largely constant. This is in contrast not only to most others of France partners but most recently especially *vis-à-vis* Germany, a fact of highly symbolic significance. This policy of disinflation became the major goal and a matter of highest prestige for the French policy, while devaluation against the DM was ruled out. Not to devalue became a signal and symbol for sound macroeconomic policies. Consequently, from April 1983 to January 1987 there were only four realignments in the ERM, and from January 1987 to September 1992 there were no realignments at all.

2. The End of Monetary Consensus Policy in Germany

After World War II and with a vivid memory of two major hyperinflations in the last three decades, there was a nearly unanimous consensus in Germany that stable and positive growth required a stable monetary policy. Even German trade unions never seriously doubted this basic concept of the "social market economy". Additionally there was never a serious conflict between the independent German Bundesbank and the various German governments. Although there were minor conflicts between the both concerning the daily course of monetary policy (see Marsh (1992) for an anecdotal description), the Bundesbank had always been careful not to push the conflict too hard out of the fear of losing its independence which is only granted by simple law. In

its position *vis-à-vis* the government, nevertheless, the Bundesbank could always count on the public's support, which also restricted the government's possible actions.² Nonetheless, time and again both authorities used each other as a scapegoat for unpopular policies. This rather non-conflictual relationship changed drastically with the occurrence of German monetary union, after which the German government defected from an implicit contract with the Bundesbank by its choice of the rate of conversion between ostmark and deutschmark and excessive fiscal spending.

2.1. The Government's Political Interests

Preceding monetary union, already with the fall of the Berlin Wall a lively discussion started among economists about the right form of economic integration between the two Germanys (see Hasse, 1993). After West Germany's Chancellor Kohl proposed in February 1990 monetary union by July 1990, the academic discussion then concentrated itself on the appropriate rate of conversion of ostmark stocks and flows into DM. This discussion was influenced considerably by the experiences with the West German currency reform of 1948 and the fear of an inflationary impact of too generous a conversion rate. As several authors point out (e.g. Neumann, 1992), the absence of a free market economy and price-setting implied that there was no sound basis to determine the equilibrium rate of conversion. The choice then was necessarily an arbitrary one. For reasons of East Germany's competitiveness, economists proposed an exchange rate between DM and ostmark in the range of 1:2 and 1:5, while the optimal choice was seen in a slight undervaluation (see e.g. Siebert, 1991). The Bundesbank instead was more concerned with the conversion of the money stocks and voiced its fear of the inflationary consequences of a 1:1 conversion of savings and debts, because socialist countries were usually characterized by a huge monetary overhang which could result in a surge of inflation. Thus, the Bundesbank proposed a rate of conversion of 2:1.

² Already the launching of the EMS in 1979 is sometimes interpreted as an attempt by the German government to restrict the Bundesbank's power via the ERM (Vaubel, 1980).

The final decision of the German government, however, which is the exchange rate authority in Germany, resulted in a weighted average between 1,8:1 and 1,6:1.³ It was a political choice and obviously caused by election motives (von Hagen, 1992) and an attempt to restrict migration from the East to the West. The first general elections for the united Germany were set for December 1990 and thus it seemed safer to show generous behavior *vis-à-vis* the new citizens as most private stocks were converted 1:1. This decision resulted in an increase in money supply (M3) of approximately DM 180 billion. This level effect, however, did not bring about the feared inflationary impulse. Thus, the financial markets scepticism, which was reflected in an immediate jump of the long-term interest by 150 basis points after the announcement of monetary union, turned out to be exaggerated. Higher inflation did not show up immediately after unification because the excess supply in EMS partner countries helped to supply the Eastern market and to satisfy the excess demand for consumer durables (Kröger and Teutemann, 1992).

Not only was the rate of conversion caused by reelection motives of the German government, however also, and more drastically, the change in the fiscal policy afterwards. The asymmetric conversion of ostmark liabilities and assets directly caused additional public deficits of about DM 30 billion because the federal budgets had to cover the gap. Moreover, the generous conversion of not only stocks but also flows (wages, pensions etc.) led to high expenditures on East German transfer payments and salaries. Rapidly increasing wages also caused unemployment, raising again transfer payments. Moreover, several investment subsidies and tax exemptions to foster investment in East Germany were designed (Kröger and Teutemann, 1992, 36).

More important, however, was the classical motive of creating a political business cycle (Nordhaus, 1975). While the rapidly rising wages in East Germany caused a major wave of unemployment, the government had to ensure winning the next elections. For this reason, a tremendous program of public spending was launched. Public construction, subsidies, employment programs etc. were not only created for the Eastern part of the country but also continued without restriction in West Germany. Government transfers from West Germany were

³ Most of the other literature refers to a rate of 1,8:1. This, however, overlooks a special item in the balance of the GDR banking system before conversion which was not converted. See Bofinger (1991) for details.

also needed for financing most of the expenditures of the new state and local governments in the East (Siebert, 1991). Consequently, the budget deficit soared, as increased spending was mainly financed by public debt instead of tax revenue. Deficit spending resulted in increased pressure on the price level which was aggravated by the post-unification boom in West Germany over the following years and the continuously rising wages in both parts of the country beyond increases in productivity (Franz et al, 1993). This posed considerable problems for monetary stability in Germany. The Bundesbank's reaction to this policy shift will now be examined.

2.2. The Bundesbank's Reaction

Monetary union confronted the Bundesbank with severe problems. Although the conversion of stocks does not *per se* increase the rate of inflation (Sargent and Velde, 1990), the problems of the Bundesbank were more difficult. In addition to a signal extraction problem, because private agents might not be able to distinguish between a one-time price level adjustment and a rise in the rate of inflation, resulting in a rise of expected inflation, the Bundesbank also faced the problem of an unknown money demand function in the new territories. The unexpectedly large increase in the money supply could either be a larger-than-expected demand for money or reflect the build-up of an inflationary potential.⁴ Both effects gave the Bundesbank an incentive to suppress even these adjustment effects, as if it were a rise in the rate of inflation, to secure the long-run credibility of its price-stability commitment. Its desire to keep its prestige as an inflation fighter might have resulted in a "contractive bias" (von Hagen, 1992, 214) relative to a cooperative solution. The biggest problem, nevertheless, was posed by the development of the public finances after unification. The Bundesbank immediately and recurrently warned that the loosening of fiscal policy might create a severe danger for the stability of the DM (see e.g. Bundesbank, 1991).

Thus, partly justified by real problems of information uncertainty, partly caused by the Bundesbank's determination to defend its reputation, the Bundesbank reacted extremely

⁴ The initial money endowment with 14.7 percent of West Germany's M3 was more than expected because the East German Staatsbank had misled the Bundesbank by treating foreign trade companies as banks. Likewise, the East German GDP was only 9.5 percent of West Germany's in contrast to the believed 14.5 percent based on wrong national accounting data (see Neumann, 1992).

cautionary, although the actual rate of conversion came very near to what it had proposed. There should have therefore been no real problem concerning stock conversion. The true reasons for tightening money supply was due to the fact that the Bundesbank felt publicly humiliated by the government. While officially the question of the correct exchange rate was still under discussion, the Chancellor announced his decision on the exchange rate, without informing the Bundesbank's president Karl-Otto Pöhl, only a few hours after having met him (Marsh, 1992). This public neglect of the Bundesbank's intentions and fears necessarily upset the Bundesbank and caused it to demonstrate its determination to defend the value of the DM and to compensate for lost prestige in Germany.⁵

Moreover, the German government embarked on the Maastricht process which is usually seen as a German commitment to European unification (Sandholtz, 1992; Garrett, 1993). The Bundesbank, however, interpreted this as an attempt to trade its autonomy for political aims. As the treaty foresaw monetary union to begin by 1999 at the latest, at the same time the Bundesbank saw its stabilization successes and its independence threatened. The Maastricht treaty of December 1991 provided the Bundesbank with yet one more reason to tighten monetary policy. Being the leader of the EMS central banks and also the "guardian" of an important international currency, the Bundesbank directors had to defend their international reputation and the "anchor" role of the DM. The Bundesbank had adopted the idea and position of being the monetary anchor of Europe and often referred to this role, stressing the importance of keeping this position especially after GMU.⁶ Nevertheless, after the Delors, the Bundesbank report had also consistently expressed its reservation *vis-à-vis* the idea of EMU. It claimed to need independence to continue the well-received stable monetary policy and voiced its fear of being undermined by less stability-oriented countries in a common monetary authority.

After the Delors-Report had been published, criticism and objections increased and were repeated continuously. Still, however, the Bundesbank could obviously live with the idea of

⁵ This reasoning is in contrast to the model of Canzoneri and Diba (1991). They argue that a central bank will increase money supply, following the Ramsey-Phelps-Rule, when the government increases fiscal spending. The difference, of course, is due to the welfare-maximizing central bank in their model.

⁶ See, for example, the speech of one director of the board, Issing, in Bundesbank (1993).

monetary union in some distant future which was regarded as a rather theoretical construction without any practical meaning. With the Maastricht treaty this position changed overnight. Now the Bundesbank could see that it would lose independence by January 1999 at the latest. With the fixed date visible, the Bundesbank embarked on a course of defending its independence by obstructing this process. A new chance was seen to secure independence beyond 1997 or 1999. Hence, not only could monetary tightness rebuild lost reputation and heal the public humiliation, now it also constituted a possibility to hinder the Maastricht-process using the inflationary effects of fiscal expansion as a reason for this policy.⁷ As a major recession was already visible on the European horizon, it was only a matter of time when the EMS partner countries would have to surrender their interest rate policy for domestic reasons. Given a major recession, almost no country is able to keep interests rates enormously high only to defend an, obviously biased, exchange rate. Lost jobs and election motives will eventually prove to be more important. I now turn to these policy reactions of the EMS countries.

3. The European Dimension of GMU

For the Bundesbank and the EMS partners, upon unification the question arose whether macroeconomic shocks following German unification required an exchange rate adjustment. The need for a real appreciation would sooner or later also imply a nominal appreciation.⁸ Thus, the Bundesbank proposed a general realignment of the EMS which, in its perspective, would have also helped to reduce the pressure on the price level in Germany as a larger part of the demand shock would be shifted onto the European partners. The EMS countries in contrast were not interested in a realignment. Although they lamented the policy mix adopted in Germany, they saw no possibility to loosen the close interest rate connection (Bofinger, 1991). At least for the so-called weak currency countries this would have resulted in an increased risk premium on interest

⁷ Vaubel (1993) adds the additional aspect that tight monetary policy in Germany raises the problems for other countries to fulfill the convergence criteria stated in the Maastricht treaty, thereby delaying monetary union.

⁸ Of course, in the long run the DM will have to depreciate because the external financing of the integration of East Germany will have to be paid off. The necessary current account surplus will require a depreciated DM (Melitz, 1991; Wyplosz, 1991).

rates. As already explained, especially France opposed the idea of devaluation as the policy of the *franc forte* had become the centerpiece of French economic policy. The Bundesbank, in turn, did not want to allow appreciation to come about by German inflation, resulting in German Reaganomics: loose fiscal policy and tight monetary policy (Portes, 1993). This implied deflation for the other countries as Germany's price level had to rise relatively to the rest of the EMS.

While the spillover effects of the interest rate increase hit the partner countries hard forcing them to raise interest rates to defend their currencies *vis-à-vis* the DM, Germany also worked as a locomotive for their exports. The demand pull effect of unification, in a situation of nearly full capacity-utilization in West Germany, met favorably with declining capacity utilization in Europe and the U.S. The EC countries started to export their excess production to Germany. Accordingly, the German current account surplus from 1989 turned into a deficit in 1991. Several countries even spurred their exports to Germany on a two-digit basis.⁹ Eichengreen and Wyplosz (1993), however, also report some competitiveness problems for Italy, Spain and Great Britain which might be due to insufficient price decreases.

In conclusion, a nominal appreciation of the DM had made it much easier for the other EMS countries to achieve real depreciation as it had reduced the necessary amount of deflation. That this did not happen is caused by the reputational conflict between France and the Bundesbank about the anchor currency of the EMS. Thus, the cooperative feature of the EMS was destroyed, leading markets to anticipate a future policy shift as domestic conditions in EMS countries worsened, implying the loss of credibility for the EMS. The breakdown of the EMS was expedited by the Bundesbank's unwillingness (Vaubel, 1993), or inability (Portes, 1993) to intervene in defence of other currencies.

4. The Story of Two Crises

The rejection of the Maastricht treaty in the Danish referendum in June 1992 marked the starting point of the first crisis, triggering expectations among speculators that the monetary union

⁹ It is a disputed issue whether the overall effect from GMU for the partner countries was a positive or a negative one. While some studies suggest that the adverse interest rate effects were larger (Hughes Hallett and Ma, 1993), others reject this finding and come up with the opposite conclusion that the export boom had a larger positive effect (Franz et al, 1993).

would be delayed beyond the date set by the Maastricht treaty (Eichengreen and Wyplosz, 1993). Speculations against the weaker currencies of the EMS followed immediately. Despite intervention the Italian lira fell towards its lower limit. The currencies in the wider band (pound, peseta, escudo) fell as well. The pressure increased with the French referendum approaching in August and September. The crisis then actually worsened from outside the EMS. On September 8, the Finnish marka suspended its unilateral peg to the ECU. Already in November 1991 it had been forced to devalue by 12 percent, due to the collapse of Soviet trade and a domestic banking crisis. Following the marka, the Swedish krona came under attack. The Reiksbank was forced to raise the interest rate to three-digit levels (the overnight rate rose to 500 percent). As it was only a unilateral peg without financing facilities and intervention, pressures could not be tamed.

Thereafter, speculation turned to the EMS as doubts about exchange rate bands in general arose. Despite Italian interest rate increases and intervention by partner countries, the lira devalued on September 13. This first realignment in five years only triggered further speculation against the weaker currencies and new entrants. Pressure on the pound, peseta and escudo mounted, while that on the lira continued. Three days later, the ERM membership of the British pound was suspended and two interest rate increases in Britain were reversed. Italy followed the British example and the Spanish peseta devalued 5 percent. The narrow positive outcome of the French referendum of September 20 only intensified speculation. France was forced to increase its interest rates and heavily intervene. Pressure spread to the Belgian franc; Spain, Portugal and Ireland reintroduced or sharpened capital controls. In November, Sweden abandoned the unilateral peg followed by new pressure on the Danish krone and the Iberian currencies. The krone could be defended but the escudo and the peseta both experienced a 6 percent devaluation. In December, Norway surrendered its peg, causing renewed pressures on the French franc and the Irish punt. The franc was defended but the punt was devalued in January 1994.

The second crisis, once again, started at the fringes of the ERM. The release of rising unemployment figures in Spain in February triggered sellings of the peseta. In May, it had to be devalued another 8 percent. Portugal, although not under such pressures, followed suit and devalued 6.5 percent. Both countries then used the gained room to lower interest rates. In central Europe the recession, spreading from the US and the UK, gathered force. Although France

expressed determination to defend the franc, gloomy reports on the French economy triggered pressure on the franc in July.¹⁰ The Bundesbank intervened heavily, resulting in tremendous increases in foreign currency reserves. As markets realized that again in July the German money supply rose by more than expected, it became clear that the Bundesbank would not be willing to lower interest rates. Although observers were convinced that a full percent lowering of the German interest rates was necessary to release pressure on the franc, making it politically possible for France to remain in the ERM, the Bundesbank declined to do so (Eichengreen, 1993).¹¹ Massive intervention ensued and by the end of July, the Bank of France had run down its reserves, while those of the Bundesbank rose by nearly DM 40 billion. This increase, if not sterilized, posed a danger to the money supply in Germany, and the Bundesbank was thus unwilling to intervene any further (Vaubel, 1993). However, only unsterilized intervention might have kept the markets from continued speculation. Moreover, from the launching of the EMS in 1979 onwards, the Bundesbank never had accepted the obligation of unsterilized and unrestricted intervention (see Eichengreen and Wyplosz, 1993).

The last weekend in July then saw the historical meeting of European finance ministers and central bankers. The central bankers proposed two ways out of the crisis. They proposed either to generally widen the band to around 6 percent or to allow the DM to leave the ERM. While France was sceptical that 6 percent would be enough, the Benelux countries refused to let the DM float against their currencies. The final decision brought the widening of the bands to ± 15 percent.

Several explanations for the occurrence of both crises have been suggested. While some focus on the underlying real problems stemming from GMU (Portes, 1992; Vaubel, 1993), others (Gros, 1992; Eichengreen and Wyplosz, 1993) mainly apply the literature of balance of payments crises (see Krugman, 1979; Obstfeld, 1986) to explain the dissolution of the tight exchange rate band. These explanations, of course, are not mutually exclusive. Speculation might explain the timing of both crises, as growing unemployment and the recession would not explain the specific

¹⁰ In the French-German case, up to 70 percent of the expected rate of devaluation are due to unemployment, government financing requirements, export competitiveness and the inflation differential (Caramazza, 1993). These findings are established for the period before both crises but clearly show how recession shapes markets' expectations.

¹¹ Although the repurchasing and the lombard rate were cut, this was regarded as inadequate.

date for the outbreak of speculation. The referenda in Denmark and France, nevertheless, signaled growing public objection to the Maastricht treaty and its requirements on monetary policy, indicating that governments might soon be forced to give up the EMS constraint. Note, moreover, that tight monetary policy set in ERM countries to defend their currencies might have actually accelerated the crisis. As Drazen and Masson (1993) explain, a deflationary policy might lead markets to expect an earlier reversal of policy as political pressures increase.

There are also different interpretations why the crises occurred in two stages. Eichengreen and Wyplosz (1993) suggest that France and the Benelux countries were nearer to the center of the EMS and thus to the Bundesbank's policy. Another, not incompatible interpretation, might be that Italy and Britain were the EMS's weakest members and thus easier to push out for the Bundesbank. Moreover, the role of different EMS preferences might help to explain this two-stage dissolution.

The developments after the collapse have been frequently interpreted as proof that the speculation, at least against the franc, had not been justified. The Banque de France did not lower its interest rates and remained more or less in the tight corridor to the DM. Moreover, wider margins reduced the risk premia on other currencies which in turn might have enabled these partners to withstand domestic political pressure. It is possible that especially France could handle a level of interest rates comparable to the German level, but not one, caused by market expectations, which is considerably higher (Eichengreen, 1993). But with the premia reduced and given the determination to become a leading currency in Europe, the French government might be willing to accept these interest rates. Another interpretation for the stable relations after the collapse might be the Bundesbank's reaction. After having forced the EMS currencies out and having shattered the ERM, it soon had space, and used it, to relax German monetary policy and to reduce the interest rate gaps.

5. A Model of EMS Crises

In this section, a simple model will be presented to analyze the collapse of the EMS. The structure of the game is presented in Figure 1. The Figure shows the game in extensive form for the case of German unification η and the following conflict between government and

Bundesbank. G denotes the decision node of the German government, and B and F that of the Bundesbank and the foreign EMS country respectively. Nature N decides whether the external shock recession ξ occurs. This decision can only be observed by the foreign authority F before setting its policy. G and B both have to decide before knowing about the recession shock ξ . The game with imperfect information is solved by backward induction.

First, however, the basic model is developed. The German government G, as represented by the fiscal authority, is concerned with inflation and output. Given its politically determined short-time horizon as elections approach, it is predominantly concerned with output because higher output enhances the chances of reelection (see Section 2.1.). Increasing government expenditures would expand output while the inflationary effect is only felt after a certain time-lag. The central bank B in contrast has a longer time-horizon. Given its function as "protector of the currency" it is primarily concerned with monetary stability, putting less weight on the output target than the government. The employees of the central bank derive their prestige and utility by keeping the price level stable. Price stability, which gives the assurance of having performed well, is their most important goal.

The German government's objective function is given by

$$(1) \quad U_G = \alpha(y - \bar{y})^2 - \beta\pi^2 + \lambda D ,$$

with

$$(2) \quad y = a_1g + a_2m - \eta ,$$

and

$$(3) \quad \pi = b_1g + b_2m ,$$

where utility is a positive function of employment y beyond a minimum rate \bar{y} and a negative function of inflation π (the preferred rate of which is zero).¹² λD is a weighted dummy for EMS membership, signifying the value of achieving European integration and to signal Germany's commitment to it. D is one for realized European Union and zero otherwise. In this short-term

¹² Notice that the assumed preferred rate of zero inflation for the government excludes the motive to reduce real government debt via inflation. The same assumption is made for the foreign government.

model, employment in the united Germany is a positive function of government spending g and the money supply m and negatively affected by the external shock of German unification η . All parameters are positive. It is assumed that government spending has a stronger impact on employment than on inflation, while the opposite is true for money supply.¹³

The Bundesbank's objective function is given by

$$(4) \quad U_B = \gamma(y - \bar{y})^2 - \delta\pi^2 - \mu D .$$

In comparison to the government the Bundesbank places relatively more value on the inflation aim and relatively less value on the employment aim. It is crucial here that monetary union has a negative value because the Bundesbank's utility is not only dependent on stable prices but also on independence. Monetary union instead would endanger the possibility to set the most preferred rate of money supply and thus undermine the prestige derived from low inflation. Even a low European rate of inflation would no longer be attributed to the Bundesbank while in the pre-Maastricht EMS the Bundesbank was viewed as exerting a disciplinary pressure on other countries. All these effects are captured by the dummy D , which is one for the loss of independence by monetary union and zero before the Maastricht treaty.

5.1. The Government and the Bundesbank Before GMU

Before the shock of German economic and monetary union, the German government and the Bundesbank set their respective policies cooperatively. The reason for this is that, as similar models show, non-cooperative behavior by the authorities results in output too high and monetary policy too tight compared to a Pareto-efficient outcome (Andersen and Schneider, 1986).¹⁴

¹³ One could argue whether g really affects the rate of inflation given a constant money supply. Increasing external government debt might be one way to justify this assumption. Another way would be to assume a higher marginal propensity to spend out of domestic debt for the public sector.

¹⁴ This result holds both for a Nash game with simultaneous choice as well as in a Stackelberg game where one authority sets its policy first and the other reacts according to its reaction function. In the special case where the central bank is only concerned with the price level (putting thus zero weight on the output aim) the result changes slightly. While the non-cooperative Nash-outcome is still Pareto-inferior, the uncooperative Stackelberg-solution is Pareto-efficient. The simple reason is that when the central bank chooses last and is only concerned with one goal, it

Here however, not Pareto-efficiency is the reason for both to play cooperatively but their own objectives. Both choose the cooperative solution because the game is repeated. Although the German government had an incentive to renege on the agreement given its short time horizon, it also knows that the Bundesbank receives a high rate of approval by the German public. Given this stability consensus, the government does not risk a confrontation with the Bundesbank in normal times, that is without the shock η . The Bundesbank in turn has no incentive to renege on the agreement because it cannot risk a conflict too strong with the government, fearing the loss of independence which is granted only by simple law.¹⁵ Moreover, given the government's consideration of the stability consensus, the Bundesbank can perform well enough in a cooperative game without confronting the government and the risk of losing independence.

Before the external shock of German unification ($\eta=0$) and the Maastricht treaty ($D=0$), it is thus assumed that the German government and the Bundesbank cooperate and maximize a common objective function. Their common objective function is a weighted average of both individual objective functions:

$$(5) \quad U_{GB} = \Theta U_G + (1 - \Theta) U_B.$$

The actual outcome of the joint maximization is determined by the relative bargaining power of the authorities as portrayed by the weights Θ and $(1 - \Theta)$. Using equations (2) and (3) in (1) and (4) and combining them in (5) gives the optimal cooperative choice of the instruments as

$$(6) \quad g_c = \bar{y} \frac{(\Psi_1 \Psi_2 (b_2^2 a_1 - b_1 b_2 a_2))}{1 + (a_1 a_2 \Psi_1 - b_1 b_2 \Psi_2)^2}$$

and

attains this by controlling only one instrument. This solution coincides with the cooperative solution where the central bank can implement its most preferred inflation goal.

¹⁵ Lately this situation has changed with the Maastricht treaty which requires all countries to grant independence to their central banks. This requirement, of course, enlarges the range of possible actions for the Bundesbank as it takes away the threat of losing independence when confronting the government.

$$(7) \quad m_c = \bar{y} \frac{(\Psi_1 \Psi_2 (b_1^2 a_2 - b_1 b_2 a_1))}{1 + (a_1 a_2 \Psi_1 - b_1 b_2 \Psi_2)^2}$$

with $\Psi_1 = (\Theta \alpha + (1 - \Theta) \gamma)$

and $\Psi_2 = (\Theta \beta + (1 - \Theta) \delta)$.

The index c refers to the cooperative setting of the instrument where, dependent on the bargaining power of either authority, looser or tighter government spending and money supply are chosen.

5.2. The Foreign Authority

The foreign EMS country F , denoted by asterisks, is assumed to profit from pegging to the DM (see Section 1). Moreover, the Maastricht treaty provides a possibility to receive these positive effects while on the other hand gaining influence on the setting of European monetary policy. This, for reputational reasons, might be especially important for France (DeGrauwe, 1993). The foreign EMS country's objective function is therefore given by

$$(8) \quad U^* = \alpha^* (y^* - \bar{y}^*)^2 - \beta^* \pi^{*2} + \lambda^* D,$$

where the dummy captures the value of being in the EMS. The relative weight λ^* placed on the dummy is allowed to vary between countries to reflect diverging preferences of different EMS countries regarding EMS membership. Examples might be France which places more weight on the EMS than England or Italy. Hence, α^* , β^* , and λ^* need not have the same values as in the German case. The monetary and fiscal instruments, however, are assumed to have the same relative impact on employment and inflation as in the German case. It is assumed that in the foreign country only one authority decides over both instruments so that no conflict between central bank and fiscal authority arises. This assumption still reflects the institutional facts in most of the EMS countries, although the Maastricht treaty requires independence for all central banks.

In case of a negative external shock ξ , the foreign authority (the government) can either choose to leave the EMS, in which case

$$(9) \quad y^* = a_1 g^* + a_2 m^* - \xi$$

and

$$(10) \quad \pi^* = b_1 g^* + b_2 m^*$$

are domestically determined. This allows the stabilization of output and employment by increasing the money supply. The costs, however, are increased inflation and an EMS dummy of zero value.

EMS membership valued positively, there is an incentive to stay in the EMS. Then, however, monetary policy can no longer be independently set. The foreign money supply is tied by $m^* = \varphi m$ to the German money supply where φ describes the tightness of the exchange rate constraint. If it is equal to one, the foreign money supply is tied completely to the German one, leaving no discretion. With $\varphi > 1$ some discretion is given for the foreign authority. Consequently

$$(9') \quad y^* = a_1 g^* + a_2 \varphi m - \xi$$

and

$$(10') \quad \pi^* = b_1 g^* + b_2 \varphi m$$

are the respective equations for the EMS case.

To keep the analysis simple, it is assumed that when the negative external shock for the foreign country ξ is zero, the EMS solution will always be chosen. This implies that the relative weight λ^* of the EMS dummy is high enough to compensate for lost autonomy. When the shock occurs, however, the foreign authority has to decide whether to choose m^* independently and to stabilize output by increasing the money supply or to stay in the EMS and to adopt the Bundesbank's monetary policy φm . For the simplicity of the analysis, I set g^* constant for both cases so that the foreign authority's decision depends solely on the money supply. This may reflect a certain institutional constraint which for example requires the level of government spending not to surpass a certain value, the slow working of the budgetary process, or a certain external borrowing constraint.

The foreign authority's decision will of course depend on which choice yields higher utility. The decision problem is consequently

$$(11) \quad \max_m U_m^*(\xi) = \begin{cases} \alpha^*(y^* - \bar{y}^*)^2 - \beta^* \pi^{*2}, & \text{for } m^* > \varphi m \\ \alpha^*(y^* - \bar{y}^*)^2 - \beta^* \pi^{*2} + \lambda^* D, & \text{for } m^* = \varphi m \end{cases}$$

The difference in both utilities for setting money supply under the EMS constraint or independently is now evaluated for the case of the shock. First, the optimal value of money supply

for the unconstrained case is calculated by using equations (8), (9), (10) and differentiating $U^*(\xi)$ with respect to m^* . This yields an optimal money supply of

$$(12) \quad \tilde{m}^*(\xi) = \frac{\alpha^* a_2 (\xi + \bar{y}^*) - g^* (\alpha^* a_2 a_1 - \beta^* b_2 b_1)}{\nu^*},$$

where
$$\nu^* = (\alpha^* a_2^2 - \beta^* b_2^2).$$

The tilda characterizes the optimal unconstrained value of the instrument in case of a shock .

Whether utility is higher when staying in the EMS or when leaving it is, of course, dependent on the German money supply as this determines the difference between \tilde{m}^* and φm . Comparing utility levels for \tilde{m}^* and φm by using equation (11) gives the following result. The foreign authority will opt for \tilde{m}^* and leave the EMS, if

$$(13) \quad \tilde{m}^*(\xi) > \varphi m + \left(\frac{\lambda^*}{\nu^*} \right)^{1/2}.$$

Note that both the value placed on the EMS membership λ^* and the width of the exchange rate band φ play an important role in the decision of the foreign government. Different values of λ^* for individual countries capture different attitudes towards EMS membership and the importance placed upon it. Only when the difference between the adequate money supply to counter the negative shock and the money supply tied to the Bundesbank is sufficiently large, will the foreign country opt out.

5.3. The Bundesbank

When the German government reneges on the implicit contract with the Bundesbank, the Bank no longer sets its money supply cooperatively. It now has the chance to optimize its utility function unrestrictedly. By using equations (2), (3) and (4), the unconstrained optimization of its objective function yields

$$(14) \quad \tilde{m} = \frac{\gamma a_2 (\eta + \bar{y}) - g (\gamma a_2 a_1 - \delta b_2 b_1)}{\omega},$$

with $\omega = (\gamma a_2^2 - \delta b_2^2)$.

The non-cooperative solution, however, gives the Bundesbank yet another possibility as it is now totally unrestricted in choosing \bar{m} . Without the government renegeing on the agreement, the Bundesbank would have no excuse for tightening domestic money supply. However, given the Maastricht treaty and knowing that the foreign government will under certain circumstances rather leave the EMS to stabilize output, the Bundesbank sees an opportunity to push the foreign country out and thereby reduce the probability of monetary union or at least hinder the process towards it. This can be achieved by tightening \bar{m} even a bit further. Assuming that the Bundesbank knows the critical difference between \bar{m}^* and φm for the foreign country, given the shock ξ , it can calculate a money supply tight enough to establish its aim of EMS collapse.

The critical value of its own money supply for which the foreign authority will drop out of the EMS is, by inverting (13), defined to be

$$(15) \quad \bar{m} \equiv \frac{\bar{m}^*(\xi) - (\lambda^* / \nu^*)^{1/2}}{\varphi}$$

For any $m \leq \bar{m}$ set by the Bundesbank, the foreign authority will exit from the EMS.

When setting its monetary target for the next period, however, the Bundesbank is uncertain whether the shock ξ will occur. Nevertheless, it has to stick to a pre-announced rate of money growth to defend its already damaged reputation. On the other hand, an unexpectedly restrictive monetary policy will also hurt the Bundesbank as it reduces employment when expectations are not fulfilled. As employment is also in the Bundesbank objective function, although being only of minor importance, the Bundesbank feels committed to its announcement. It can neither be unexpectedly loose nor restrictive.

Yet the Bundesbank knows that with a certain probability P an adverse shock ξ will occur in the form of a recession which spills over to Europe. P can either be seen as the probability of the occurrence of a shock or, alternatively, as uncertainty concerning the magnitude of the shock. It gives the opportunity to drive the foreign country out of the EMS. Thus the Bundesbank's expected utility for that case is given by

$$(16) \quad EU_B = PU_B(m) + (1 - P)(U_B(m) - \mu Dh) ,$$

with

$$h = \begin{cases} 1, m \leq \bar{m} \\ 0, m > \bar{m} \end{cases},$$

where P is the probability that $\xi = 1$ and $(1-P)$ is for $\xi = 0$. (16) captures the possibility of driving other countries out given the occurrence of the shock, but also depicts the risk of setting money overly tight ($h=1$) when no shock occurs. Hence the Bundesbank faces a trade-off. By comparing its utility levels [$U(\tilde{m}) - EU(\bar{m})$], the choice problem is

$$(17) \quad m = \max \left\{ \tilde{m}, \bar{m} + \left(\frac{P\mu}{\omega} \right)^{1/2} \right\}.$$

Consequently, important factors for the Bundesbank are the probability P that ξ occurs and the value the Bundesbank places on the EMS goal. When the unconstrained money supply \tilde{m} is sufficiently larger than the restrictive level \bar{m} , the Bundesbank will prefer to let the other country stay in the EMS.¹⁶ If, however, the difference is not large enough, the Bundesbank will set \bar{m} . In this case the EMS will fall apart, as the money supply of the Bundesbank is now too tight for others to follow. The foreign country no longer adheres to the EMS.

5.4. The German Government

The German government, faced with the adverse shock of German unification η and knowing the reaction of the Bundesbank, has to decide whether to break the agreement with the Bundesbank, even if this will imply a relatively tighter money supply, making even more fiscal spending necessary as it undermines the positive effects of \tilde{g} . Moreover, it knows that this might also endanger the future of the EMS. In case of an expected negative shock for the foreign authority, the Bundesbank might take the chance to dissolve the EMS by making its monetary policy overly restrictive. Thus, the government has not only to decide on the future relation with its own central bank but also on the external effects of its policy choice.

The government's decision problem is thus given by

¹⁶ Precisely when $\tilde{m} > \bar{m} + \left(\frac{P\mu}{\omega} \right)^{1/2}$, the Bundesbank will abstain from breaking up the EMS.

$$(18) \quad \max_G U(\eta) = \begin{cases} U_G(g_c, m_c), & \text{for } m = m_c \\ EU_G(\bar{g}, m), & \text{for } m = \begin{cases} \bar{m} \\ m \end{cases} \end{cases}$$

It has to compare the utility derived from continuing the cooperative policy with regard to the Bundesbank, in which case g_c is relevant, or to set \bar{g} in a non-cooperative manner. In the second case expected utility is dependent on the choice of the Bundesbank's money supply. By using (1), (2) and (3), the non-cooperative choice of government spending is given by

$$(19) \quad \bar{g} = \frac{\alpha a_1 (\eta + \bar{y}) - m(\alpha a_1 a_2 - \beta b_1 b_2)}{\mathcal{G}},$$

with $\mathcal{G} = (\alpha a_1^2 - \beta b_1^2)$.

By comparing utility levels $[U_G(\bar{g}) - U_G(g_c)]$, the government will decide to play non-cooperatively, if

$$(20) \quad \bar{g} > g_c + (m_c - m) \left(\frac{\alpha a_2^2 - \beta b_2^2 + \lambda}{\alpha a_1^2 - \beta b_1^2} \right)^{1/2}.$$

In this case, the reelection motive of the German government is strong enough for it to break the contract with the Bundesbank, even knowing that this may instigate the possible collapse of the EMS. According to this perspective, the German government embarked on the Maastricht accord to signal its commitment to European unity, all the while knowing that its own action in the course of German unification would incur the risk of breaking the treaty.

6. Conclusion

The model presents one possible way to understand the events in Europe after German unification, leading eventually to EMS crises and collapse. In allowing for different values of λ^* it captures the different values individual countries place on the survival of the "hard" EMS and their image of being similarly tough on monetary policy as the German Bundesbank. Different values of this parameter might then be interpreted as reflecting the decision as to when a foreign

government will finally decide to renege on the contract of tying its hands in the EMS. Moreover, the width of the band influences the decision of a government to break the EMS constraint as well. The widening of the band can also be interpreted in this light, making continued membership possible. The model is also general enough to capture other monetary crises when one of the authorities involved decides to renege on the EMS. Thus, most importantly, this model sheds light on the decisive role one crucial actor, the Bundesbank, might have played here. Thereby it is a first step towards closing an important gap in the literature.

The important lesson from the recent crises is probably that more attention must be directed towards diverging interests of independent authorities like central banks. Although no-one might doubt the benefits of an independent central bank, one should also be attentive to the fact that it can obstruct politically set decisions out of pure self-interest and thus undermine international agreements. Ironically, the Maastricht treaty which requires independent central banks for monetary stability might eventually result in more such problems when central banks try to realize their own objectives. The abuse of bureaucratic self-interests by central banks is surely a field which deserves more research, especially in the European context, envisaging a common and independent European Central Bank.

Another interpretation would put the blame mainly on the German government. Only its action, caused by the dominant reelection motive, prompted the Bundesbank to use its independence to obstruct the Maastricht process. Had the government not signed the treaty as a compensation to other European countries for their acceptance of German unification and had it not confronted the Bundesbank when deciding on the conversion rate, the EMS might still be intact. Thus, the German government knowingly accepted the risk of its collapse. That it actually sought the EMS collapse, however, seems to be too strong an assumption as the German export industry, being an important interest group, is much dependent on European trade relations. Although being a net contributor to the European Union's budget, Germany is also one of the main beneficiaries of European Integration.

References

- Andersen, Torben and Friedrich Schneider (1986) "Coordination of Fiscal and Monetary Policy Under Different Institutional Arrangements", European Journal of Political Economy 2, 169-191.
- Blanchard, Olivier and Pierre-Alain Muet (1993) "Competitiveness through Disinflation: An Assessment of the French Macroeconomic Strategy", Economic Policy 16, 12-56.
- Bofinger, Peter (1991) "Geld- und Kreditpolitik nach Bildung der deutschen Währungsunion", in H. Gröner, E. Kantzenbach and O. Meyer, eds: Wirtschaftspolitische Probleme der Integration der ehemaligen DDR in die Bundesrepublik, Berlin: Duncker und Humblodt, 151-175.
- Bundesbank (1991) Monatsbericht der Deutschen Bundesbank: Oktober 1991, Frankfurt.
- Bundesbank (1993) Auszüge aus Presseartikeln, June 11, 5-8.
- Caramazza, Francesco (1993) "French-German Interest Rate Differentials and Time-Varying Realignment Risk", IMF Staff Papers 40, 567-583.
- Canzoneri, Matthew B. and Behzad T. Diba (1991) "Fiscal Deficits, Financial Integration, and a Central Bank for Europe", Journal of the Japanese and International Economies 5, 381-403.
- Collins, Susan and Francesco Giavazzi (1992) "Attitudes Towards Inflation and the Variability of Fixed Exchange Rates", NBER Working Paper 4057.
- Drazen, Allan and Paul R. Masson (1993) "Credibility of Policies versus Credibility of Policymakers", NBER Working Paper 4448.
- Eichengreen, Barry (1993) "The Crisis in the EMS and the Transition to EMU: An Interim Assessment", University of California at Berkeley, mimeo.
- Eichengreen, Barry and Charles Wyplosz (1993) "The Unstable EMS", Brookings Papers on Economic Activity 1, 51-143.
- Fitoussi, Jean-Paul et al. (1993) Competitive Disinflation-- The Mark and Budgetary Politics in Europe, New York: Oxford University Press.
- Franz, Wolfgang; Gustav Heidbrink and Werner Smolny (1993) "The Impact of German Unification of West Germany's Goods and Labor Market: A Macroeconomic Disequilibrium Model in Action", Paper presented at the Tel Aviv-Konstanz Conference on International Economics, Konstanz, October 14-15.
- Fratianni, Michele and Jürgen von Hagen (1992) The European Monetary System and European Monetary Union, Boulder: Westview.
- Fratianni, Michele; Jürgen von Hagen and Christopher Waller (1992) "The Maastricht Way to EMU", Princeton Essays in International Finance 187, Princeton University.

- Garrett, Geoffrey (1993) "The Politics of Maastricht", Economics and Politics 5, 105-123.
- Giavazzi, Francesco and Alberto Giovannini (1989) Limiting Exchange Rate Flexibility--The European Monetary System, Cambridge: MIT-Press.
- Giavazzi, Francesco and Marco Pagano (1988) "The Advantage of Tying One's Hands: EMS Discipline and Central Bank Credibility", European Economic Review 32, 1055-1082.
- Gros, Daniel (1992) "Capital Controls and Foreign Exchange Market Crises in the EMS", European Economic Review 36, 1533-1544.
- Hamada, Koichi (1977) "On the Political Economy of Monetary Integration: A Public Economics Approach", in R.Z. Aliber, ed: The Political Economy of Monetary Reform, London: Basingstoke, 13-31.
- Hasse, Rolf (1993) "German-German Monetary Union: Main Options, Costs and Repercussions", in A. Ghaussy and W. Schäfer, eds: The Economics of German Unification, London: Routledge, 26-59.
- Hughes Hallett, Andrew and Y. Ma (1993) "East Germany, West Germany, and their Mezzogiorno Problem: A Parable for European Economic Integration", Economic Journal 103, 416-428.
- Kröger, Jürgen and Manfred Teutemann (1992) "The German Economy After Unification: Domestic and European Aspects", Economic Papers 91, Commission of the European Community.
- Krugman, Paul (1979) "A Model of Balance of Payments Crises", Journal of Money, Credit and Banking 11, 311-325.
- Marsh, David (1992) The Bank That Rules Europe, London: Heinemann.
- Melitz, Jacques (1991) "German Reunification and Exchange Rate Policy in the EMS", CEPR Discussion Paper 520, February.
- Neumann, Manfred J.M. (1992) "German Unification: Economic Problems and Consequences", Carnegie-Rochester Conference Series on Public Policy 36, 163-209.
- Nordhaus, William D. (1975) "The Political Business Cycle", Review of Economic Studies 42, 169-190.
- Obstfeld, Maurice (1986) "Rational and Self-Fulfilling Balance of Payments Crises", American Economic Review 76, 72-81.
- Portes, Richard (1993) "EMS and EMU After the Fall", The World Economy 16, 1-15.
- Sandholtz, Wayne (1993) "Choosing Union: Monetary Politics and Maastricht", International Organization 47, 1-39.

- Sargent, Thomas and Francois Velde (1990) "The Analytics of German Monetary Unification", Federal Reserve Bank of San Francisco, Economic Review, 33-51.
- Siebert, Horst (1991) "German Unification: The Economics of Transition", Economic Policy 13, 287-340.
- Vaubel, Roland (1980) "The Return to the New EMS: Objectives, Incentives, Perspectives", Carnegie-Rochester Conference Series on Public Policy 13, 173-221.
- Vaubel, Roland (1993) "The Breakdown of the ERM and the Future of EMU: Explanations, Predictions and Simulations from a Public Choice Perspective", University of Mannheim, mimeo.
- von Hagen, Jürgen (1992) "German Unification: Economic Problems and Consequences. A Comment", Carnegie-Rochester Conference Series on Public Policy 36, 211-222.
- Wyplosz, Charles (1991) "On the Real Exchange Rate Effects of German Unification", Weltwirtschaftliches Archiv 127, 1-17.

Figure 1

